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THE BRICKBUILDER.

AN ILLUSTRATED MONTHLY DEVOTED TO THE ADVANCEMENT OF ARCHITECTURE IN MATERIALS OF CLAY.

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THE past year has witnessed several destructive fires in buildings which were constructed on approved fire-proofing systems, and though in every case the manifest advantage of fire-proofing has been beyond question, and its efficacy has been demonstrated to be all that is claimed for it, the average newspaper has not always seen fit to award it its fair due. The recent fire in the Hotel Rexford, Boston, however, was of a different sort. This is a structure erected only a few years since in a district which is crowded with inflammable structures. The hotel itself, though by no means first-class in its appointments, seems to have been constructed on the whole in a very thorough manner, and the fire-proofing, which was on the Fawcett system, was equal to the test made upon it by a fire which started in the basement late one afternoon. While the exact cause of the fire is open to doubt, it certainly started from a portion of the basement where was stored a considerable quantity of oil, and this oil fed a conflagration which threatened to be very disastrous for a while. A series of explosions, followed by a brisk blaze shooting up the large ventilating shaft, destroyed everything in the basement of the hotel, and the flames, entering into the open windows above, caused considerable damage up as far as the seventh floor. Had this structure been of any ordinary construction, there is no doubt that the whole edifice would have been consumed and a large loss of life might have ensued, as the hotel had about four hundred guests at the time. One employé was badly burned about the face and head, and the total damage was confined to about eight thousand dollars. The basement was a total wreck. The bar was blown to pieces, and in the upper stories the lace curtains caught from the upward rushing flames, so that fire almost instantly spread through a number of rooms, and all the conditions for a serious conflagration were certainly present, so that an excellent opportunity was afforded of demonstrating the check that can be put upon fire in buildings of this character. If we remember rightly, at the time this hotel was built it was found that the cost of building it fire-proof throughout was something less than 10 per cent. more than the cost of ordinary construction. The Boston building law does not allow any hotel to be built of anything but fire-proof construction. But even had the proprietors of this building had the option, it is evident that the added cost of fire-proofing has been more than repaid to them by the immunity from serious loss. The Boston *Herald*, commenting in an editorial on this fire and its results, said: "We are having quite a number of strictly fire-proof buildings put up in Boston. Several citizens that we know are contemplating constructing dwellings of this type for their own use, and if we are to have fires it is well that they should occur under conditions that furnish object lessons of the many advantages which this form of construction has over that of all other classes."

IT is a common tendency of human nature to think that our neighbors are a little better off than ourselves. In a recent number of the *British Architect*, in the reports of some discussions before an architectural society regarding the housing of the poor, we notice that the use of wood for dwellings of this nature was spoken of as offering great possibilities and being in some respects more advantageous and costing considerably less than brick. We have been trying so long and hard to make our clients and friends believe that brick is the best material for a dwelling house, that it comes like a shock that our English cousins, whose example we emulate, and to whose work we point with pride, should to the slightest extent envy us our cheap wooden buildings. In only one respect have we found a wooden house more advantageous than brick; it is cheaper in first cost. In every other respect, it would certainly be a backward step for English constructors to consider anything like an imitation of our shanties.

NOTES AND CLIPPINGS.

RELICS IN THE TOWER OF LONDON.—Unusually interesting and valuable discoveries have been made in the Tower of London in the process of laying the foundations for the erection of a new guard room near the White Tower. The workmen cut the Roman wall of the second century and found a number of perfectly preserved flue tiles for the diffusion of hot air from the hypocaust. The tiles are excellent specimens. They measure 15 ins. in length, 6½ ins. in width, and 4½ ins. in depth.—*New York Sun*.

INCREASED USE OF BRICK.—One phase of building operations in this city, as shown by statistics published in our real-estate column to-day, is of interest to the general public. An analysis of the figures shows the increased use of brick, as compared with wood, as a building material. It might be supposed that, as the area re-

stricted to brick, iron, or stone buildings becomes more nearly built up, and outside the Back Bay district little of it remains unimproved, the relative proportion of new brick buildings to wooden would decline. But the contrary is the case, and much of the new brick construction is in localities where wood might legally be employed, showing that the use of the more lasting and fire-resisting material is growing because of its own merits. The fact that so many builders find it more profitable to use brick, even outside the brick limits, goes to prove that an extension of them would not be so burdensome as has been represented, and also the shortsightedness in allowing the better construction to be menaced by the poorer.

In May, 1895, only 10 per cent. of all the new buildings for which permits were granted were of brick; the next year the percentage rose to 25; in 1897, it was 23; in 1898, 28, and this year it reaches 32, nearly a third. Much the same showing is made by the first five months of the last eight years, during which the percentage of new brick buildings to the whole was as follows: 1892, 15; 1893, 23; 1894, 16; 1895, 21; 1896, 23; 1897, 20; 1898, 24; 1899, 35. A noteworthy feature of recent construction is the substitution of brick for wood in many cases where the latter might be used for three-family houses, although there is still erected a lamentable number of frame three-family dwellings. The new tenement or apartment house,— that is, substantially a building for more than three families, and required to be fire-proof by the Boston building law,— has nearly disappeared, and where it is seen it is almost invariably a structure six or more stories in height. For anything under six stories, the three-family house is almost invariably the maximum in this city, having displaced the four-story apartment house, so popular before the fire-proofing law was enacted. The latter house now thrives in Cambridge and other near-by suburbs where the Boston law does not apply. There is an unusually large amount of important building going on in this city at the present time, hotels, office buildings, and warehouses constituting the bulk of it, with one theater and a music hall being planned.— *Boston Herald.*

County Supervisors' Valuations of Architects' Services. — When does the architectural profession of California intend to do something, through its organizations or individually, to circulate information regarding the ethics of architectural practise, so that public bodies and others may not unknowingly continue to make ridiculous announcements when inviting designs for public or other work?

In our issue of May 17, we drew attention to an offer of a fee of $25 (!!!) from the supervisors of Mariposa County, for plans and specifications for certain additions to and improvements at their county hospital buildings, and this magnificent sum was to be paid to the "successful" architect. (The quotation marks are our own.)

If that be architectural "success," what *are* we coming to? But it may be the supervisors acted in perfectly good faith, and really "expected" to receive designs from *bona-fide* architects of standing in return for the opportunity of winning this $25 prize in a competition with each other. And now, again, we have the supervisors of Shasta County asking for competitive designs for a $10,000 hospital building, and for which work $75 has been put aside to pay the architect whose design *may* be selected. The presumption is that the supervisors are to be the sole judges as to which *is* the best design submitted. But can these gentlemen really know that if an architect were engaged to render the necessary professional services for such a building, the recognized fee would be $500, or without supervision say $250? Little enough in all conscience for efficient and faithful service! But if these gentlemen expect $250 worth of services on the off chance of such a sum as $75 being awarded to *one* of them, there can be only one result from such a proposition. If, on the other hand, these gentlemen know so little of the practise and responsibilities attending the work of *bona-fide* architects as to expect efficient service simply on the chance of one of their number receiving this princely sum, then we are doing them (and any other boards with similar ideas) a kindness in thus drawing attention to the absurdity of such a proposition. Any body of gentlemen having such views would also probably be so little acquainted with architecture itself that they might experience some difficulty in selecting the really best design after all, a matter which we know from experience is oftentimes a very difficult one even for a professional assessor to decide. Architects of experience and standing will not, of course, for a moment have anything to do with such competitions as these, and it is to be hoped that the unemployed junior members of the profession will have more self-respect than to assist public bodies in getting designs under such conditions as those offered in the present instances. — *Pacific Builder.*

PERSONAL AND CLUB NEWS.

Van Vleck & Goldsmith, architects, New York City, have removed their offices from 156 to 111 Fifth Avenue.

The last regular monthly meeting of the Sketch Club, of New York, was held in the Fine Arts Building, West 57th Street, through the courtesy of the Architectural League. These rooms have been procured for future meetings of the club.

BOOK REVIEWS.

English Country Houses. Boston: Bates & Guild Company.

The English mansion represents a type of architecture so entirely *sui generis* and so full of its own peculiar charm that one never feels like comparing it with anything else in the whole realm of art. The English country house is something unique, and the publication by Bates & Guild of one hundred photo-prints of the best examples of the old work will be welcomed by every artist, appealing as it does so strongly to the lover of quaint, picturesque simplicity. The photographs are most carefully chosen, and were throughout, we believe, selected under the direction of one of our foremost architects. We can hardly hope to have just such work in this country. Our habits of life are not such as to promise the results which here seem to have been accomplished so easily. For that matter, it is very rarely that a modern English house is able to have just the particular character which is so charming in the older work; but we always profit most by aspiring towards what we may not perhaps quite achieve, and if our country architecture could have a tithe of the delicious spirit which these photographs so well portray, we would be going a long way on the road towards a national style. Much of the work shows the half-timbered and rough cast style, but there are also numerous examples of charming use of brick, either alone or in combination with half-timbered work, such as is illustrated by Hunstanton Hall in Norfolk, or Westwood in Worcestershire. For that matter, though it may seem heresy to acknowledge it, it is not always the material which counts most in this old work. The general effect is so quiet and unobtrusive in the best of it that it matters very little whether the wall be of brick, stone, or rough cast plaster, for the result in either case is a charming habitation. We most heartily commend this publication.

Sanitary Engineering of Buildings. By Wm. Paul Gerhard, C. E. In 2 vols. New York: William T. Comstock, 23 Warren Street. 1899.

This volume comes at the end of a long series of publications representing in one sense the development of sanitary engineering into a science from the early days of the "plumber and sanitary engineer," when the acme of household sanitation was represented by the obsolete Hellyer pan closet. Mr. Gerhard is so well informed on this subject that he is able to present the facts about household plumbing in a manner that makes them of value to the reader, and though much of what he says has come to be quite trite, and seems almost superfluous in a volume of this year, still the educational necessity of work of this kind is an ever present one, and though it is not easy to present anything that is especially new on the subject of plumbing, it is hardly saying too much to claim for this book that it is one of the best publications on the subject which have been offered to the public.

Architectural League of America.

ON June 2 and 3 a convention of the architectural clubs of the country met at Cleveland, Ohio. It was notable not only for its practical results but as the germ and evidence of a wide and energetic movement for the furtherance of architecture in America.

The movement began in the practical necessity of uniting the efforts of single architectural clubs into a working unit. The rapidly increasing number of architectual exhibitions throughout the country had brought confusion to both manager and contributor. The architect had had his desk covered with entry blanks for a dozen conflicting exhibitions, and hanging committees looked in vain for drawings which could not be traced in their wanderings.

The St. Louis Architectural Club, in December, 1898, first voiced the need for a systematic cooperation between the scattered exhibition committees. Acting upon this suggestion, the Chicago Architectural Club, with the indorsement of Philadelphia and St. Louis, and the informal assent of Boston and Cleveland, called a meeting of the architectural organizations of America at Cleveland.

Ninety-seven registered delegates represented thirteen societies: The Architectural League and the Society of Beaux Arts Architects of New York, the architectural clubs of St. Louis, Chicago, Cleveland, Boston, Philadelphia, Pittsburgh, Detroit, and Toronto (Canada), and the Illinois, Pittsburgh, and Cleveland chapters of the American Institute of Architects. The majority of the delegates were the younger element of the profession, averaging about thirty-two years of age, and being about evenly divided between practising architects and prominent draftsmen, and they brought the greatest enthusiasm to the work. Cheering interrupted the speeches; the special committees worked till early morning, and the convention gave up an excursion rather than adjourn the session.

The address of welcome to the city was delivered by the president of the Cleveland club, Mr. Albert E. Skeel, to which the president of the Chicago club, Mr. J. C. Llewellyn, responded, outlining the object of the meeting simply as a free interchange of ideas between the members. Mr. Llewellyn was made chairman, and Mr. N. Max. Duning, also of Chicago, secretary of the convention. A press committee was appointed to place the work of the association accurately before the public.

Discussion was opened with a paper by Mr. Adin B. Lacey on "Club Organization and Management," drawn from the experience of the T Square Club, of Philadelphia, of which he is president, and much of the success of which can be attributed to the business of the club being in the hands of a carefully selected, working, executive committee, leaving the time and thought of the members free for the main object of design. He was followed by representatives of every club, who compared the circumstances under which each was organized, and the means and results of their work.

The practical object of the convention was expressed by Mr. Henry W. Tomlinson, of Chicago, in his paper on the "Annual Exhibition." To effect the needed reforms a committee was appointed to arrange a schedule of consecutive exhibitions, forming a circuit by which a drawing once entered can pass through each subsequent exhibition; the hanging committee of each exhibition retaining its independence and the owner being at liberty to designate at which cities he wishes his drawings to appear. In order to simplify the details of business, an overlapping of committees was arranged, by which each exhibition committee is to contain one member from the previous exhibition of the circuit. It is evident that the clerical expense, the annoyance to contributors by repeated solicitation, and the difficulties of management are thus minimized.

For the collection of exhibits a national committee was formed with a resident foreign member, who will make it his business to secure a selection of drawings from England and France. These

COUNTRY HOUSE.
Meryn Macartney, Architect, London.

COTTAGE, HARPENDEN. HOUSE FOR ERNEST GEORGE.
Ernest George & Peto, Architects, London.

drawings, which before were difficult for Western clubs to obtain, will now make the entire circuit before being returned to Europe. Being in bond to the custom house, no exhibition except those in the designated cities can secure these drawings.

As there are a few dates in the schedule still open, the officials of the League will be glad to communicate with any club wishing to enter the circuit. The League will do all in its power to foster new architectural organizations. If a few architects, in no matter how small or remote a town, will club together and send one of their members to the next convention, he will likely bring back ideas on which a successful chapter can be built.

The suggestion was also made to add a local "arts and crafts" section to every exhibition, so as to knit the allied arts with architecture. The subject of the exhibition catalogue, yearly demanding more care from the club, and becoming at the same time more interesting to the general public, was discussed in relation to the architectural magazine, with which it seems to enter into competition. The decision stood that the catalogue ought to explain and enforce the central idea and object which an exhibition to be worth anything must have. It becomes a year-book to present to the public the results of the club's work in the cause of good architecture and to point the way to local municipal improvements. Sufficient text to point the moral of the drawings is thus a distinct advantage.

The morning session was concluded by a paper by Mr. Julius F. Harder, of New York, earnestly advocating the establishment of a rigid code to govern competitions. The form drawn up by the joint committee of the Architectural League, of New York, and the T Square Club, of Philadelphia, and approved by both of these organizations over a year ago, was accepted by the convention, which recommended its adoption by all the other individual clubs.

In the afternoon, as the guests of the Cleveland Club, the delegates were driven in tally-hos through the system of parks which ultimately will form a continuous wooded avenue engirdling and penetrating the entire city. In the evening, by special invitation of a committee of the Cleveland Chamber of Commerce, the delegates of the convention were present in the library of the Chamber at an address by Mr. Bush-Brown, of New York, on "The Grouping of Public Buildings," in reference to the contemplated municipal buildings of the city of Cleveland, to which much careful attention is being paid. He gave a striking example of what economists would call the "utility of the beautiful" in the Congressional Library at Washington, where the decoration of carving and color, at an expense of 7 per cent. of the total cost, produces 90 per cent. of the attraction or "drawing power" of the building.

The lecture of Mr. Bush-Brown was in line with the sentiment of the convention that the architectural club has a work to do beyond mere self-improvement. Representing the best taste and artistic culture of the community, it should be in the fighting line of municipal improvement. City councils and building committees should be made to realize that if the medical profession can maintain a board of public health, the architectural club is a self-constituted board of public art. A resolution was therefore offered by Mr. Bush-Brown, which was adopted: —

That the League announces that in its judgment, to further the best interests of municipal development and improvement, it would be wise for municipal authorities, civic clubs, and public-spirited individuals interested in these matters in all cities, no matter how remote, forming a local committee to which they invite the president of the

BASSETT CHURCH, SOUTHAMPTON.
E. P. Warren, Architect, London.

HOUSE AT HAMILTON, MASS.
Winslow, Wetherell & Bigelow, Architects, Boston.
(Sheet of detail and plan shown on Plate 48.)

League, to appoint an advisory committee of four experts, to act in conjunction with the first three as a committee of seven in formulating a comprehensive scheme, it being understood that advisers are to be chosen from different cities and will act for a nominal fee. Let us suppose, for instance, Milwaukee to be the city contemplating civic improvement. The president would then in all probability appoint experts from Chicago, St. Louis, Detroit, and Cleveland, if in his judgment men of suitable capacity were to be found at that end of the circuit. This is not so much for developing the large Eastern cities, where local and municipal fine art societies exist, as for the smaller cities of the United States, where there is an abundance of civic pride and a dearth of well-trained, expert advisers.

"The Architectural Society and its Progressive Influence," by Mr. Albert Kelsey, of Philadelphia, was the first paper of the morning session. He pointed out a still wider field for the united effort of the members of the convention. Whatever lack of sympathy existed between the public and the profession was due to the fact that architects followed obsolete precedents and foreign traditions instead of going down to the heart of American life and working outward, the logical result of its needs and conditions. Mr. Louis H. Sullivan, in a ringing paper read by the secretary, enforced the necessity of a vital architecture on modern and American lines, and Mr. Dwight H. Perkins pointed out that, like all great men and movements, architecture must be of and for the people. Mr. Ernest Flagg regretted his inability to attend and sent his fullest sympathy. The secretary read, also, numerous letters and telegrams from prominent practising architects, professors, and draftsmen, expressing their sympathy with the convention. These came from representative architectural scholars ranging from New Orleans to Milwaukee, and from Milwaukee to Paris, and spoke eloquently of the future of American architecture.

HOUSE AT BROOKLINE, MASS.
Chapman, Frazer & Blinn, Architects.

HOUSE AT BROOKLINE, MASS.
Chapman, Frazer & Blinn, Architects.

The feature of the afternoon session was a paper by Mr. Peter B. Wight, secretary of the Illinois State Board of Examining Architects, on "The Operation of the Illinois License Law." He advocated this movement toward the internal improvement of the profes-

ROTUNDA, UNIVERSITY OF VIRGINIA.
McKim, Mead & White, Architects, New York.

sion for every State, and the committee recognized it as one in which time only was necessary to complete success. Mr. Wight, as a member of the Illinois Chapter of the American Institute of Architects, assured the League of the sympathy and moral support of the Institute.

The committee on permanent organization, composed of Mr. Julius F. Harder, chairman, Architectural League of New York; Irving T. Guild, of the Boston Architectural Club; Albert Kelsey, T Square Club, Philadelphia; William B. Ittner, St. Louis; Herbert B. Briggs, Cleveland; J. C. Llewellyn, Chicago, presented articles of organization at the morning session, which were unanimously adopted by the convention. Much of the credit for these belongs to Mr. Harder, the chairman of the committee.

The articles provide for a confederation of independent societies which every year meet for mutual understanding and exchange of ideas. The League does not attempt in any way to interfere in the affairs of the individual club nor with professional practise except in the case of some flagrant abuse.

The objects of the Architectural League of America, as the association is formally named, are, in the larger sense, to promote American architecture and the allied fine arts, to encourage a native architecture inspired from modern ideas, to unite individual organizations in order to work out their common interests to the best advantage.

The articles of organization continue as follows: —

"There shall be an annual convention to be composed of delegates from the associations composing this League, to be held at a time hereafter to be designated. Every allied member shall be entitled, unless otherwise provided in the terms of alliance, to be represented at every meeting of this League, by not more than four delegates or duly appointed alternates of such delegates, having collectively one vote. Every member must appoint four delegates to represent it at every meeting of the League, and such delegates must be members in good standing of such member, and may also appoint four alternates of such delegates, who may be members of any other active member, except that no member of the executive board shall be appointed an alternate.

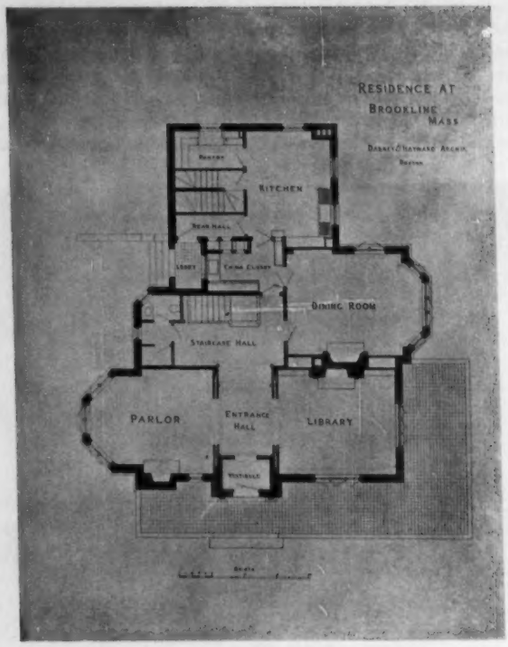
"All the delegates of one active member shall collectively have one vote. Dues shall be uniform, regardless of membership of the individual associations, and sufficient to meet the running expenses of the League. The management of the League between conventions shall be vested in an executive board, to be composed of a president, first vice-president, second vice-president, secretary, and treasurer, to be elected annually, and the convention shall have power to appoint necessary committees.

"These articles of organization shall continue in force until the next convention."

Under this constitution the following officers were elected: President, Albert Kelsey, Philadelphia; first

SIDE DOOR, HOUSE OF C. E. PATTERSON, ESQ., TROY, N. Y.
H. L. Warren, Architect, Boston.

HOUSE AT BROOKLINE.
Dabney & Hayward, Architects, Boston.



PLAN OF HOUSE AT BROOKLINE.
Dabney & Hayward, Architects, Boston.

vice-president, William B. Ittner, St. Louis; second vice-president, J. W. Case, Detroit; secretary, H. W. Tomlinson, Chicago; treasurer, Herbert B. Briggs, Cleveland.

The convention closed with a reception and banquet at the rooms of the Century Club, on the fifteenth story of the New England Building, overlooking the illuminated city and Lake Erie beyond. The toastmaster was Mr. Herbert B. Briggs, of Cleveland. The speeches of the evening were: "Welcome," by Mr. Benjamin S. Hubbell, of Cleveland, to which the new president of the League responded, using "Progress before Precedent" as his text; "What We Gain by Concerted Movement," Mr. William B. Ittner, of St. Louis; "Reciprocity between Architectural Clubs and Architectural Publications," Mr. Irving T. Guild, of Boston; "The Architectural School from an Architect's Standpoint," Mr. George R. Dean, of Chicago.

The next convention will be held at Chicago, on Thursday, Friday, and Saturday, June 7, 8, 9, 1900. It will be looked upon with interest by the general public as well as the members of the profession who are alive to their responsibilities.

The convention of the Architectural League of America was remarkable for the enthusiasm with which a new idea was received and indorsed. From a meeting called to adjust the business details of exhibition committees and for an informal discussion of club affairs, it has become a national organization with a definite purpose. It has touched live questions, entered a wide and new field, and has shown the energy which guarantees success.

ST. PATRICK'S CHURCH, WHITINSVILLE, MASS.
Maginnis, Walsh & Sullivan, Architects, Boston.

THE BOSTON ARCHITECTURAL EXHIBITION.

THE Boston Architectural Club, in conjunction with the Boston Society of Architects, has just concluded a very successful exhibition of architectural drawings, which in some respects has been unique. It was held in the rooms of a private institution, the St. Botolph Club, which is essentially *the* art club of Boston, though the name is usurped by another organization. The available room at the St. Botolph Club was small, being limited to a gallery hardly more than 20 by 30 ft. Consequently, the exhibition itself was quite restricted. There was hardly a drawing or photograph exhibited which was not worthy of study, and, since the choice was so restricted, large drawings were barred out and the contributors felt under a sort of esthetic obligation to send in of their choicest and best. The result showed an exhibition which was a delight to the soul of him who loveth not the day of great endeavors, but can take pleasure in the contemplative and the

studious. We are all in too much of a rush now-a-days, and we all know it and are all ready to applaud the contemplative type, even though unwilling for the sake of our competitors to let up on the pressure; and the object lesson of these choice, carefully selected drawings is so obvious in its moral application that if it went no further the exhibition would have accomplished a great deal. It is an easy thing to collect two or three thousand drawings now-a-days,

FORECOURT OF RESIDENCE, GEO. K. BIRGE, ESQ., BUFFALO, N. Y.
Little & Browne, Architects, Boston.

but to winnow through a mass of contributable stuff and narrow the choice down to the contents of a small room means work on the part of the committees, which will surely be appreciated by any one who has had to do with such a mill in the past; and the committees were able to gather not only from Boston, but by a happy combination of circumstances were able to present a very fair showing of English work side by side with what was gathered from Boston, New York, and Philadelphia.

Now, a mere description of the drawings which are sent in to an exhibition is not of much value. The catalogue will do that a great deal better than the columns of THE BRICKBUILDER. And where there is so much that might be said, we can at best only touch upon the more obvious features of the exhibition. We do not know whether to be grateful or otherwise for the mind which is responsible for the catalogue of the exhibition being printed with stiff board covers. On the whole, we are inclined to think it is an advantage, for although the volume is quite too large to be safely entrusted to one's side pocket, it does form an admirable pad for notes, and we are inclined to treat it much more respectfully than if it were a brochure, which could be doubled up and thrown into most any corner of one's hip pockets. Inside the covers, the catalogue follows the precedent of the T Square Club by presenting some literature. The committee nailed their colors to the mast by a statement that "Instead of confining ourselves largely to drawings, we have admitted a considerable proportion of photographs; and, instead of putting the chief emphasis on modern work, we have exhibited many old examples, both photographs and sketches. Finally, instead of giving the greatest space to what is generally known as 'important work,' we have deliberately chosen to show simpler and smaller things, not even ruling out the homely barn, if it seemed to have, in outline and composition, qualities which would appeal to an artist." Then there follows a very readable *résumé*, by Mr. C. Howard Walker, of the laws covering architecture in relation to the growth of cities, which is certainly apropos of the existing legislative disturbances anent building operations, even if possibly a little irrelevant to the being of an architectural catalogue. The survey of the year's architecture which follows, by Prof. H. Langford Warren, is full of good suggestions. We get far too little general criticism of this sort. Our work is judged only too shallowly by our friends or too unfairly by our casual enemy, and we would there were more of the restrained cautious spirit by which Mr. Warren measures the work of the day. For the rest, the catalogue is all that could be desired, barring the ever-present and numerous advertisements, but as the sinews of war are essential to even the most select exhibitions, and as architects are notoriously poor, and the public will not pay a high price for a catalogue, the advertisements must be, unless some day a generous and exceptionally fortunate architect should be minded to endow permanently a catalogue which shall be forever independent of the advertiser.

We cannot forbear just a little complacency in recalling how many of the buildings illustrated in this exhibition meant the employment of brick and terra-cotta. Numbers, however, do not count, but if every example of brick dwellings could be as thoroughly charming as the houses at Princeton, N. J., and at Chestnut Hill, Pa., by Cope & Stewardson, we would all want to build our houses with brick, and shingles would be a drug on the market. Indeed, for that matter, nearly all of the Philadelphia work which is shown is preeminently an exemplification of what can be done in brick and terra-cotta. The building for the Natural History Museum, in connection with the University of Pennsylvania, is undoubtedly the most successful brick and terra-cotta structure which has been erected of recent years in this country. It is the product of three of the best known firms of architects, and might be pardoned if presenting a certain confusion in conception, but on the contrary it is thoroughly consistent throughout, and has a charm which is seldom found this side of North Italy. The whole spirit of the design is so delightful that the repeated exclamation heard from architect friends is, "What an awfully good time Messrs. Day, Eyre, Cope, and Stewardson must have had with this building!" If we can judge by the reports which reach us from Philadelphia, it has offered a most interesting example of friendly cooperation between kindred minds.

PERKINS HALL, HARVARD UNIVERSITY.
Shepley, Rutan & Coolidge, Architects, Boston.

No less worthy of notice is Mr. Day's design for the Clinical

Amphitheater, an excellent, straightforward Florentine Renaissance structure, with plenty of simple wall space and a broad, generous shadow from an ample cornice. Mr. Wilson Eyre contributed a number of his characteristic drawings. One of them is peculiarly typical of the man and of his point of view. It is nothing but a rough sketch looking down Broad Street, Philadelphia, with the tall mass of the City Hall in the distance and an unfinished steel skeleton looming up on the right, but if we could only train our eyes to see things as Mr. Eyre saw them in this sketch, we would have no need to go abroad to cultivate our love for the picturesque, for if there is any prosaic spot on earth it is the vicinity of the Philadelphia City Hall, and yet this sketch shows the charming flavor of romance which tells us that the elements were there, only we have not known how to appreciate them.

It is by no means a jump from the Philadelphia work to the English examples. On the contrary, exactly the same spirit is shown in both. And the difference between the drawing which is styled "A Preliminary Essay," by Mr. F. Inigo Thomas, who bears a name which ought to carry with it a large sense of responsibility, and the study by Mr. Eyre of a "Garden for Beauveau Borie at Jenkintown" (save the combination!) is one of locality rather than character. The English drawing is a most ingenious combination of perspective sketches, fragmentary floor plans, bits of interiors, and straight elevations, all combined to illustrate a simple block of dwellings most charmingly disposed with surrounding grounds; brick buildings of course and naturally successful, though the clever way in which the design itself is made manifest and easily apparent even to the eyes of an incredulous client, is by no means the least charm of the drawing. There was also in the exhibition some of the characteristic work of Ernest George and Peto, together with some of

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the modern English ecclesiastical work. Here, again, a comparison might be made with our friends Cram, Goodhue & Ferguson, and although comparisons are very apt to be invidious, we have seen few of the English modern churches which excel such work as is shown by the proposed All Saints Church, Brookline. A younger firm shows in this exhibition a different kind of work equally serious and successful: the design for St. Patrick's Church, at Whitinsville, by Maginnis, Walsh & Sullivan, which we trust marks the beginning of a new era in the building of Catholic churches in this country. With all the opportunities which a Catholic church can offer to the architect, the structures which have been imposed upon the community in the past have been a reproach to architecture, but here we have the substance of things hoped for, the evidence of things not heretofore seen.

Polychromy was not strongly in evidence in this exhibition. There was one ambitious attempt, however, deserving of study. Mr. Cass Gilbert's drawing for the Broadway Chambers showed an eighteen-story office building in which the three upper stories, presumably in brick and terra-cotta, were carried out with an attempt of color, which on the drawing seemed quite successful. There was also

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evidence of a certain amount of color treatment about the building for the Museum of the University of Pennsylvania, one of the porches showing a suggestion of some extremely knowing inlaid brick mosaics, which implied a feeling for color that is most satisfactory.

Of the work nearer home, there was shown some photographs of Wheatleigh at Lenox, by Peabody & Stearns, which is about as near as we can hope to come to an Italian villa. The same architects also exhibited photographs of a house at Pittsburgh, which sees all the charm of the old John Hancock house and goes it considerably better. Then of the Birge house at Buffalo, by Little & Browne, there was exhibited both the very fine brick and iron gateway, the picturesque colonial stable, and the stately mansion itself. Surely, no one is able to more successfully treat the colonial style than this firm. Of a different type was Mr. Wheelwright's recently completed building for the Horticultural Society in Boston, a dignified, thoroughly successful adaptation of the best colonial motive.

We would also like to mention Shepley, Rutan & Coolidge's design for Conant Hall, and Coolidge & Wright's Randolph Hall, two of the best of the Harvard dormitories, and the building by Chamberlin, Stickney & Austin for the Cambridge Homes for Aged People, a simple, straightforward, colonial brick structure set in a quaint, old-fashioned garden, and shown by a water-color drawing which has all the charm of outdoor air. And finally, we cannot stop without another reference to Philadelphia. The building of the Lutheran Publication Society, by Frank Miles Day, was too good to pass unnoticed, and though of the simplest of motives, a three-story gabled front, it was worked out so cleverly, with a large archway in first story, two pedimented windows above, and four little windows in the attic with a little dot of an eye in the center of the gable, it is not unfit to stand as a type of the kind of work the Philadelphia coterie is striving so sincerely to produce. And though we want every one to have a chance, and the workers are many, yet may we another year have the annual exhibition as small, as select, and as thoroughly artistic as this has been.

Sand for Mortar.

BY IRA O. BAKER.

M. Am. Soc. C. E., Professor of Civil Engineering, University of Illinois, Champaign.

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THE quality of the sand has an important effect upon the strength and durability of the mortar, although its importance is generally overlooked, even when the cement is subject to rigid specifications.

The chemical nature of the sand appears not to have any important bearing upon its value for mortar. Silicious sand is usually the best. Calcareous sands are usually friable, *i. e.* composed of soft particles, in which case they are less suitable for making mortar. Although calcareous sand is ordinarily inferior to silica sand, nevertheless it is certainly true that crushed limestone makes a stronger mortar, in both tension and compression, than natural sand, and the difference of strength seems to increase with the age of the mortar. Part of the greater strength is unquestionably due to the greater sharpness of the screenings, and the part that increases with the age of the mortar seems to be due to some chemical action between the cement and the limestone.

The dampness of the sand is a matter of some importance. If the sand is very damp when it is mixed with the cement sufficient moisture may be given off to cause the cement to set partially, which may materially decrease its strength. This is particularly noticeable with quick-setting cements. Ordinarily for the best results the sand should be practically dry.

The usual specifications for sand for mortar are that it "shall be sharp, clean, and coarse." To these requirements should be added a fourth, viz., the proportion of voids should be as small as possible.

Sharpness. Sharp sand, *i. e.* sand with angular grains, is preferred to that with rounded grains on the assumption (1) that the angular grains are rougher and therefore the cement will adhere better; and (2) that the angular grains offer greater resistance to moving one on the other under compression. On the other hand, the sharper the sand the greater the proportion of the interstices between the grains, and, consequently, the greater the amount of cement required to produce a given strength or density. But a high degree of sharpness is more important than a small per cent. of voids.

The sharpness of sand can be determined approximately by rubbing a few grains in the hand, or by crushing it near the ear and noting if a grating sound is produced; but an examination through a small lens is better. Sharp sand is often difficult to obtain, and the requirement that "the sand shall be sharp" is practically a dead letter in most specifications.

Cleanness. Clean sand is necessary for the strongest mortar, since an envelope of loam or organic matter about the sand grains will prevent the adherence of the cement.

The cleanness of sand may be judged by pressing it together between the fingers while it is damp; if the sand sticks together when the pressure is removed it is entirely unfit for mortar purposes. The cleanness may also be tested by rubbing a little of the dry sand in the palm of the hand; if the hand is nearly or quite clean after throwing the sand out, it is probably clean enough for mortar. The cleanness of the sand may be tested quantitatively by agitating a quantity of sand with water in a graduated glass flask; after allowing the mixture to settle, the amount of precipitate and of sand may be read from the graduation. Care should be taken that the precipitate has fully settled, since it will condense for a considerable time after its upper surface is clearly marked.

Sand is sometimes washed. This may be done by placing it on a wire screen and playing upon it with a hose, or by placing it in an inclined revolving screen and drenching with water. When only comparatively small quantities of clean sand are required, it can be washed by shoveling into the upper end of an inclined V-shaped trough and playing upon it with a hose, the clay and lighter organic matter floating away and leaving the clean sand in the lower portion of the trough, from which it can be drawn off by removing for a short time plugs in the sides of the trough. Sand can be washed fairly clean by this method at an expense of about ten cents per cubic yard exclusive of the cost of the water.

Although it is customary to require that only clean sand shall be used in making mortar, a small quantity of finely powdered clay will not materially decrease the strength of the mortar. In some instances clay to the amount of 10 per cent. of the sand seems not to decrease the strength of the mortar.[1] Mortar containing considerable clay is much more dense, plastic, and water-tight and is occasionally convenient for plastering surfaces and stopping leaky joints. Such mortar is not affected by the presence of water.

Sand employed in actual work frequently has 5 to 8 per cent. of suspended matter. The specifications for the masonry on the Chicago Sanitary Canal limited the suspended matter to one half of 1 per cent.

Fineness. Coarse sand is preferable to fine, since (1) the former has less surface to be covered and hence requires less cement; and (2) the coarse sand requires less labor to fill the interstices with the cement. The sand should be screened to remove the pebbles, the fineness of the screen depending upon the kind of work in which the mortar is to be used. The coarser the sand the better, even if it may properly be designated fine gravel, provided the diameter of the largest pebble is not too nearly equal to the thickness of the mortar joint.

Table I. gives the results of a series of experiments to determine the effect of the size of grains of sand upon the tensile strength of cement mortar. The briquets were all made at the same time by the same person with the same cement and sand, the only difference being in the fineness of the sand. The table clearly shows that coarse sand is much better than fine. Notice that the results in line 4 of the table are larger than those in line 3. This is probably due to the fact that the sand for line 4 has a greater range of sizes. If this explanation is true, then since the sand in each line of the lower half of the table has greater variety of sizes than those in the upper half, the coarse sand is relatively better than appears from Table I.

TABLE I.

EFFECT OF FINENESS OF SAND UPON THE TENSILE STRENGTH OF 1 : 2 CEMENT MORTAR.

Reference Number.	Sand caught between the two sieves stated below.	Tensile strength, in pounds per square inch after				
		7 days.	1 mo.	3 mos.	6 mos.	12 mos.
1	No. 4 and No. 8	243	442	539	470	665
2	" 8 " " 16	269	345	473	512	572
3	" 16 " " 20	186	250	313	397	396
4	" 20 " " 30	211	281	322	402	440
5	" 30 " " 50	149	205	238	275	318
6	" 50 " " 75	122	214	260	275	308
7	" 75 " " 100	98	153	211	208	253
8	Passing No. 100	98	155	161	229	271

Table II. shows the fineness of several natural sands employed in actual construction; and as the sands were to all appearances of the same character, this table also shows, at least approximately, the effect of fineness upon tensile strength. This table agrees with the preceding in showing that the coarser sand makes the stronger mortar. This conclusion is perfectly general. As a rule, the sand employed in making cement mortar is much too fine for maximum strength or for minimum cement.

If the voids are filled with cement, uniform coarse grains give greater strength than coarse and fine mixed; or in other words, for rich mortars coarse grains are more important than small voids. But if the voids are not filled, then coarse and fine sand mixed give greater strength than uniform coarse grains; or in other words, for lean mortars a small proportion of voids is more important than coarse grains.

[1] Report of Chief of Engineers, U. S. A., 1894, pp. 3001–3010; and *Trans. Am. Soc. of Civil Engineers*, Vol. XIV., p. 164.

TABLE II.

TENSILE STRENGTH OF A 1:3 CEMENT MORTAR WITH NATURAL SANDS DIFFERING CHIEFLY IN FINENESS.

Reference Number.	Per cent. caught on sieve No.								Per cent. passing No. 100.	Tensile strength. Pounds per square inch.
	4	8	16	20	30	50	75	100		
1	0	26	21	16	11	9	8	7	2	700
2	0	29	29	13	10	12	5	1	1	447
3	0	22	21	11	17	20	8	1	1	370
4	0	13	15	10	19	33	6	1	1	341
5	0	9	10	6	11	45	15	2	1	332
6	0	13	15	7	8	38	15	4	1	309
7	0	0	0	0	1	6	69	23	2	246
8	0	0	0	0	0	0	0	6	94	200
9	0	0	0	2	3	15	45	30	5	189

The fineness of several sands employed in noted works is shown below, the larger figures being the number of the sieve, and the smaller figure preceding the number of a sieve represents the per cent. retained by that sieve, and the small figure after the number of a sieve represents the number passing that sieve: Poe Lock, St. Mary's Fall Canal, ^{5} 20 ^{15} 30 ^{35} 40 ^{45}; St. Regis sand, Soulanges Canal, Canada, ^{12} 20 ^{26} 30 ^{61} 50 ^{11}; Grand Coteau sand, Soulanges Canal, Canada, ^{14} 20 ^{30} 30 ^{27} 50 ^{30}. In passing it is interesting to note that a 1 to 2 mortar with the last sand was only 79 per cent. as strong as the preceding; and with a 1 to 3 mortar only 71 per cent. The specifications for the sand employed in the masonry on the Chicago Sanitary Canal was "that not more than 50 per cent. should pass a No. 50 sieve, and not more than 12 per cent. should pass a No. 80 sieve." Tables II. and III. show the fineness of a number of sands employed in actual work.

Voids. The smaller the proportion of voids, *i. e.* interstices between the grains, the less the cement required, and consequently the more economical the sand.

The proportion of voids may be determined by filling a vessel with sand and then determining the amount of water that can be put into the vessel with the sand. This quantity of water divided by the amount of water alone which the vessel will contain, is the proportion of voids in the sand. The quantities of water as above may be determined by volumes or by weight. The proportion of voids may be determined for the sand loose or rammed. In either case it is more accurate to drop the sand through the water than to pour the water upon the sand, since with the latter method it is difficult to eliminate the air bubbles, particularly if the sand be first rammed. If the sand is dirty and the water is poured upon it, there is liability of the clay's being washed down and puddling a stratum which will prevent the water penetrating to the bottom. If the air bubbles are not excluded, or if the water does not penetrate to the bottom, the result obtained is less than the true proportion of voids. Again, if the sand is dropped through a considerable depth of water, there is liability that the sand may become separated into strata having a single size of grains in each, in which case the voids will be greater than if the several sizes were thoroughly mixed.

The per cent. of voids varies with the moisture of the sand. A small per cent. of moisture has a surprising effect upon the volume and consequently upon the per cent. of voids. For example, fine sand containing 2 per cent. of moisture uniformly distributed has about 20 per cent. greater volume than the same when perfectly dry. This effect of moisture increases with the fineness of the sand and decreases with the amount of water present.

Table III. shows the voids of a number of natural sands employed in actual work.

The proportion of voids is independent of the size of the grains, but depends upon the uniformity of the size and varies with the form of the grains and the roughness of the surface. A mass of perfectly smooth spheres of uniform size would have the same proportion of voids, whether the spheres be large or small. A mass of perfectly smooth spheres packed as closely as possible would have 26 per cent. of voids; but if the spheres are packed as loosely as possible the voids would be 48 per cent. A promiscuous mass of bird shot has about 36 per cent. of voids. The difference between this and the theoretical minimum per cent. for perfectly smooth spheres is due to the variation in size, to roughness of the surface, and to not securing in all parts of the mass the arrangement of the shot necessary for minimum voids. German standard sand has grains nearly spherical and nearly uniform in size, having slightly rough surface, and has 41 per cent. voids loose (see line 2, Table III.). The difference in per cent. of voids between this sand and a mass of shot is due to the more irregular form and rougher surface of the sand grains. Standard crushed quartz retained between the same sieves as German standard sand has 55 per cent. of voids (see line 1, Table III.), the excess in voids of this over German standard sand being due to the rougher surfaces and sharp corners preventing the grains from fitting closely together.

TABLE III.

FINENESS, VOIDS, AND WEIGHT OF NATURAL SANDS.

Reference Number.	Description.	Fineness. Per cent. caught on sieve No.					Fineness. Per cent. passing No. 80.	Voids. per cent.		Weight. Pounds per cubic foot.	
		5	20	30	50	80		Dry and loose.	Saturated and rammed.	Dry and loose.	Dry and well shaken.
1	Standard Crushed Quartz	0	0	99	1	0	0	55	43	81	86
2	German Standard Sand	0	0	99	1	0	0	41	38	94	104
3	Bibus's Bank, Urbana	0	100	0	0	0	0	46	37.8	91	99
4	" " "	0	0	100	0	0	0	45	36.3	88	97
5	" " "	0	0	0	100	0	0	44	36.0	85	92
6	" " "	0	0	0	0	100	0	45	35.7	86	97
7	" " "	0	0	0	0	0	100	47	33.3	83	94
8	" " "	0	27	21	23	9	20	41	30.0	91	100
9	Cement Walk, Champaign	0	13	17	24	39	5	44	36	83	97
10	Pumping Station, Chicago	0	41	19	18	18	3	45	37	101	113
11	Municipal Work, Chicago	0	27	19	32	14	8		28*	....	106
12	Much Used in Chicago	0	3	1	3	24	67		37*	....	98
13	Municipal Work, Illinois	0	4	1	2	12	81		37*	....	96
14	Natural Sand Artificially Mixed	0	38†	12	13	13	25‡		22*	....	123

* Dry and well shaken. † 12% on No. 10; 13% on No. 15; 13% on No. 20.
‡ 12% passing No. 100.

If the mass consists of a mixture of two sizes, such that the smaller grains can occupy the voids between the larger, then the proportion of voids may be very much smaller than with a single size of grains. For this reason a mixture of two grades of sand of widely different sizes has a smaller per cent. of voids than does any one size alone (compare lines 1 to 7 with the remainder of Table III.).

The best sand is that which has grains of several sizes, such that the smaller grains fit into the voids of the larger, the proportion of any particular size being only sufficient to fill the voids between the grains of the next larger size. If the grains are spherical and the diameter of the smaller is about one fifth of the diameter of the larger, the smaller grains will just fit into the interstices between the larger ones. The smaller the voids the greater the economy, and the more dense and stronger the mortar.

The finer the sand the more uniform the size of the grains, and consequently the less the proportion of voids. On the other hand, the finer the sand the less sharp it is and the greater the surface to be covered. Since it has been conclusively shown that the coarser the sand the better (for example, see Tables I. and II.), the argument in favor of fine sand is not as potent as that against it. Farther, the advantage of coarse sand over fine increases as the proportion of cement decreases, since with the smaller proportions of cement the voids are not filled.

Conclusion. An examination of the preceding data shows that very fine sand makes a much weaker mortar than coarse sand, and also that different sands vary considerably in the proportion of voids and therefore differ in the amount of cement required to produce any particular strength. Therefore, before adopting a sand for a work of any considerable magnitude, all available sands should be carefully examined with reference to (1) their effects upon the strength of the mortar, (2) their per cent. of voids or the amount of cement required with each, and (3) their cost. If mortar of any particular strength is desired, the proportion of cement should be adjusted according to the fineness and voids of the best available sand.

The Qualities and Limitations of Ceramic Products.[1]

BY KARL LANGENBECK.

THE builders of all ages have resorted with utmost freedom to the use of clay and the products that are made from it as structural material and as means of furnishing and beautifying the house.

This has been no less the case in the earliest times, when the adobe hovel superseded the cave dwelling, than in the latest structure of cement and terra-cotta.

It would seem trite, therefore, to discuss the subject of clay as a building material, if the manifold uses and properties of clay and its products did not bring up many problems that present themselves in different aspects to the architect and the ceramist.

As clay is the decomposition product of nine tenths of the common rocks, as it is readily transported hither and thither by rain, landslides, winds, streams, and ocean currents, its universal distribution brings it to hand almost everywhere. It differs, of course, much according to the rocks it has been derived from and according to the way it has been mixed, but its fundamental properties, chemical and physical, are so marked that every one will recognize it as *clay*, and every clay has a practical use to which it can be put. There is no such thing as a good clay and a poor clay, though, of course, a clay may be good or poor or worthless for a *particular* use.

The primary quality by which every one recognizes it, its plasticity, and the attendant quality of being able to sustain itself in masses of almost any size or shape, make for it universal utility, as its formation and transportation, which I have just pointed out, make for it universal occurrence.

These properties *alone* are the valuable ones for many builders: for instance, the railroad, hydraulic, and military engineer; not so with the modern architect. But while the architect may never be called upon again to build the adobe hut, remember that the Assyrian palace stood to our day, until its mud walls were robbed of their incrusting alabaster slabs and glazed tile.

Remember, too, that the military engineer has discarded stone walls for clay banks, and that stone forts, turreted castles, and battlements, once so formidable, are now laughed at as the bugaboos of a childish age. Are architects sure that they could not build many an incrusted mud wall to-day at less cost and greater utility than many they now build of costly material?

There is no human history of early building or fashioning with clay. We always had it, as the animals had it before us, and I believe the architect will realize some day, as the military engineer has already learned, that the grandmother arts of the wasp, the mud swallow, and the beaver can still be as modern as they are ancient.

The property of hardening in the fire is also a very early human discovery. It was an incidental observation made even before fire was kindled for a purpose, and at its very awakening human intelligence combined the idea of these two properties of clay, forming and hardening, so that we cannot put our fingers on a race in the lower stage of barbarism that has not left us vessels, figures, or utensils so made, except perhaps in the arctics.

It may be of interest in a history of building that in exploring the mound fort near Madisonville, Professor Putnam discovered that the ancient builders had hardened the surface of the embankment by burning it topically.

While these are the fundamental properties on which all the clay materials in the building arts are made, and which man has always known, they derive their greatest value to the architect from a property learned only by long experience, but which, in spite of this, he is constantly prone to forget. This is the absolute indestructibility and permanence of clay products to disintegration and wear. The bricks in the baths of Titus and Caracalla are without signs of disintegration, while the stone of the Colosseum is strongly decayed. The marble in the tessellated floors of Roman villas still preserved in France, along the Rhine in Germany, and about Bath in England, were worn through in the days of their use, while the tessera of baked clay in reds, buffs, browns, etc., used in conjunction with the marble in the same floors, are hardly touched to this day.

In the lobbies of many public buildings paved with marble tile and red or blue *clay* tile in the corners, the marble is so dished through wear that the clay tile in their corners stand ⅛ to ¼ in. above their level, yet the public and even the architects hardly believe their own senses in witnessing this common fact, for a very natural reason. The velvety texture of even a hard-burned clay *looks* soft; the polished surface of a natural stone always *looks* hard and immutable to the elements of wear and atmospheric disintegration, yet on the mineralogist's scale the hardness of the former is nine as against four to five for the best marbles.

It may be well to remind you in this connection of the scientific reason for this indestructibility of clay and clay products; it is that clay is the residuum from the breaking down of nearly all rocks. It is what is left of rocky material when the mechanical forces of the earth and the chemical action of the atmosphere have done their worst and the tooth of time can do nothing further. But less obvious properties than plasticity, solidifying under fire, and durability open out a still greater field of utility.

First, the clays themselves, depending upon their origin, burn to a great range of colors, from snowy white, through yellows, buffs, and browns, to reds of varying shades, and their affinity for oxides of chromogenic metals, such as manganese, cobalt, copper, nickel, iron, enlarges the color scale into the blues, greens, pinks, black, etc. And these colors are without exception absolutely permanent. Fading is never possible, though, of course, they may become obscured and indistinguishable, even permanently so, by griming, if the pores of the body still admit, or through careless use are allowed to take up dirt.

Again, the indifference of clay bodies to fire, and the fact that their coefficients of expansion can be brought to the same degree of expansibility and contractibility as glasses and enamels, enables melting these upon their surfaces in thin or thick layers, making the porcelain and pottery industry proper possible, and opening out a palette of brilliant colors far beyond that of the clay colors themselves, and far beyond the possibilities of decoration with pigments.

And furthermore, clay products are among the poorest conductors of heat, offer effective resistance to its fusion and cracking, and are also non-conductors of electricity. These facts now largely interest the architect, for there is scarcely a building in which he does not have to consider them.

And lastly, let me add to this brief survey of the properties of clays, the discovery that a chemical union of *clay* with mortar materials, lime and sand, effected by heat and in proper proportions, has opened out in Portland Cement possibilities in masonry and molding in the most durable of stones that would be inconceivable without such a material.

But all these conspicuously valuable properties of clay that have been utilized in the most manifold ways and have furnished the householder, the decorator, the engineer, the metallurgist, the electrician, and above all the architect, with a wealth of available utensils and materials, are all hedged in and modified by the most aggravating limitations and often the most unexpected drawbacks.

These difficulties are always present, and even attend the making of the simplest and best known articles, so that the manufacture of clay wares, from the ordinary brick to the finest of porcelain, or the production of cements, involves a technical skill and attention to subtle details almost unknown in other mechanical and chemical operations.

Particularly is this the case in the making of most building materials, so that many desirable properties are bound up with limitations, from which they are almost inseparable.

This may be illustrated by the following examples.

[1] Read before the Cincinnati Chapter of the A. I. A.

The more delicate a clay in taking fine impressions, the more plastic and fine grained it is, the more sensitive it is to the effects of pressure, which only appear after the ware is burned. This may show in the form of hair cracks or again as bulged or protuberating welts, particularly if the piece is burned to vitreousness. If in turning up such a clay upon the potter's wheel, the workman's fingers press the clay too hard, though afterward it be turned off on the lathe and polished to the smoothest surface, the fire will bring out spiral rings upon the jar or vase, showing the original track of the man's fingers. If it be a bust pressed in a mold, the fire may bring out upon the smooth cheek of a female head coarse lumps or welts where the clay was forced too energetically. In a work of art more careful handling by a skilful and higher-priced man is the remedy, but in a commercial product or in a building terra-cotta it is necessary to use a coarser clay, which, while it does not show these blemishes, also takes a rougher impression. You cannot exact of a building ornament the surface and finish of a bisque figure without risking more objectionable features or paying a price far in excess of the value of the piece for the place.

Great advance has been made in the handling and caring for ware during the perilous operation of drying: ventilated drying rooms heated by steam coils that admit of close regulation of temperature, and mechanical lifts and carrying apparatus, which avoid strains to the tender, freshly formed bodies. But the shrinkage, particularly of large pieces and of flat ones pressed from clay flour, which takes place in the drying, causes a certain percentage of loss, in spite of all precautions and corrective appliances, through cracking. Where this crack is not disfiguring, where it is beyond the possibility of observation, or does not impair the strength of the piece, why should it compel its rejection? It is cheap criticism that rejects because of an obvious but essentially unimportant blemish. It is this cheap criticism of a mechanical age that strikes from the category of our present building materials many a useful and beautiful article because the flawless ones are insufficient to pay for the loss of those foolishly rejected. If the Moorish builders had judged similarly, never would a mosque or minaret have been covered with tile.

We pay to-day an unnecessarily high price for building terra-cotta, because the manufacturer breaks and makes over many a piece that he would use in his own house, but is afraid to submit to the judgment of the architect and the building public.

Great improvements have likewise been made in the building of kilns and the management of the fire. The purpose of these improvements has been mainly directed toward eliminating the variations that the fire produces in the tint of the pieces according to their proximity to the source of heat and also to the variations in shrinkage that the same cause effects. Kilns are now built much larger than the old potters dared use, and improvements in pyrometric measurements are such that differences between the hardest and softest parts of a kiln can be detected within 25 degs. and can be regulated. Through these means larger amounts of ware of the same shade and size can be obtained than ever before.

But the variations in these can never be prevented altogether, and it is only possible to obliterate the effects of these variations by very careful sorting of the pieces according to size and shade. In the regular pottery industry this is not exacting, because the shape of the ware and the fact that the pieces are used individually lead to no exact scrutiny. But in the building materials, where many pieces are laid in close proximity, comparison to a minute degree is unavoidable, and this is particularly the case in tile. These are shaded often to forty different shades and sized to a variation which can just be recognized by the sense of touch, about $\frac{1}{64}$ of an inch. The former is done because the public demand absolute uniformity of tint, the latter because close jointing is exacted. Two rows of 3 in. tile 16 ft. long, varying but $\frac{1}{64}$ in. in the individual pieces, would show a variation of 1 in., a very important difference in a small floor.

The tile for the old English cathedrals were burned in little beehive ovens but 5 or 6 ft. in diameter and 3 ft. high. The tiler had to crawl in on his hands and knees to set the ware, and the great floors were laid with practically all of the product without sizing or shading. As we look at them to-day, they are still satisfying. The jointing, large enough to take up the inequalities in size, gives a texture to the floor, the variation in shade, a liveliness of color, and no shrill-voiced American woman ever freezes the marrow in your bones by exclaiming, "Ain't it nice — just like oilcloth!"

With all our technical improvement, with all the expense and trouble of sizing and shading, so that 1,000 ft. of tile are split up into little piles that will scarcely lay a 25 ft. vestibule each, we refine our product until it looks like the imitation, oilcloth!

I am frequently asked why it is not possible to make glazed tile that will not craze. It is possible. But if you expect to produce effects such as you obtain with the present glazes, if you demand the soft lead glasses that are highly refracting, and insist upon having the brilliancy heightened by having the glaze put on the pieces in a thick layer, the freedom from crazing can only be obtained in a small percentage of ware, the bulk of which shivers in the fire, being shattered, in other words, by the strength of the contracting glaze.

Brilliant effects of color can be obtained by the use of thin, non-crazing colored glazes, by using a number of colors in such artistic juxtaposition as to heighten the effect of each other; but where you demand a single color, as is now almost invariably the case, and expect it to be brilliant and satisfying, it can only be obtained by the conditions named, which carry the defect criticized fundamentally with them. But is this really a defect in a purely decorative ware?

Before the Paris Exposition, the manager of the Rookwood Pottery, when I was its superintendent, told me he would have to discontinue the work unless it could be made so as not to craze; it was impossible for him to sell it because of this. I told him the condition could be fulfilled, but it would then not sell at all, because it would cease to be "Rookwood." The style and quality of the ware precluded its use for other than mainly ornamental articles; why therefore ruin by technical conditions that are altogether utilitarian? The factory struggled along until its products were submitted to the arbitrament of the French people at the exposition of 1889. It became famous at a bound. A timid American suggested to a French connoisseur, "But the glaze is cracked!" "Any fool can see that," was the reply; "what of it?" No one of any sense or taste has alluded to the crazing of Rookwood ware since. But, it is claimed, a white wall tile is surely thin glazed, and should be as free from crazing as table and kitchen ware shows itself to be under much more exacting use. But the bulk of our wall tile practically all craze.

Our domestic wall tiles are all made with highly refracting lead glazes, so that the individual piece will look as smooth and glossy as possible, and that because of the lower fire required in producing them they may be uniform in shade. They belong to the same category of wares as the colored glazes, namely, faience.

If you could flatten out the curves of a cup or dish, you would be astonished to see that its glaze is not as smooth and brilliant as one of these tile, for a level surface reflecting the light entirely in one direction magnifies every inequality a hundred-fold. If you take a set of plates, looking absolutely the same in color, and cut tile out of their bottoms, placing them together as tile are laid, you would marvel at the variation in tint. When builders waive their demand for brilliant, straight, and uniformly tinted wall tile, and have them hard fired and covered with alkali lime glaze, they will get tile that will not craze. Once accustomed to the matter, I believe, too, that they will be liked better. The blare of the glassy faience wall is not in good taste. The softer, more eggshell-like texture of the alkaline, porcelain-like glazes is far more agreeable.

Without instancing more of the innumerable problems and con-

ditions that confront the clay worker, and upon which he must ask for changed views and compromises from the architect, I should like to answer the question that probably arises in your minds: "Is all the trouble of going into these conditions and details worth while?" Of course the question will be dismissed as idle as soon as it is asked, for clay products always have and always will be used in larger and larger measure, and for finer and finer purposes. It is, however, well to bear constantly in mind that so many qualities of high merit, often no less subtle than the difficulties, appertain to clay wares, that no amount of effort in interesting oneself in these problems is without fruit.

Let me instance in this connection the superior frost-proof quality of brick, tile, and terra-cotta over all natural stones. It is a common fallacy to suppose that this property is merely attendant on density, and that these clay wares are only more frost proof in proportion as they approach vitreousness. This is by no means the case. You are familiar with very porous sandstones that are far more frost proof than hard crystalline rocks, having very little water absorption. Of course only a material having taken up some water will be shattered by frost. But a very small amount may be as destructive as a large quantity. The root of the matter lies almost solely in the homogeneity of the material.

When a body saturated with water is subjected to frost, the expansion of ice crystals does no damage to its structure if no obstruction is presented to the weaving of the crystals through the pores. If, however, the body is intersected with layers of denser or impervious matter, even if these be no thicker than a sheet of paper, an immense pressure is exerted on these planes, resulting in the cracking of the body or the splitting off of layers of the same along the planes of these denser divisions. There is scarcely a crystalline rock that is not intersected with these impervious or difficultly penetrable divisions, and under the action of the frost these are the lines along which sooner or later its structure breaks down.

Even rocks of such hardness and density as granite succumb to this disintegrating action, only topically and slowly it is true, but very distinctly for all that, as you can see on many a monument in almost any cemetery. Sufficient water for destructive action is taken up between the crystals of quartz and feldspar or hornblende; this in freezing is impeded in its free movement by the thin and tough crystals of impervious mica, often lying in continuous layers over a larger patch, and the resultant pressure is sufficient to split off thin flakes and crystals from the surface, the chemical action of the water and atmosphere continuing the action in the rough and pitted places through their solvency.

Even poorly tempered and burned clay bodies are always free from impervious or denser strata, and under all circumstances more homogeneous than any crystalline rocks, which are often, and sometimes even minutely, crossed and recrossed with denser and almost impervious layers, only discoverable by the microscope. If the baked clay body be only sufficiently burned so that the cell walls of the pores are of reasonable strength, even a large water absorption does not endanger a breaking down by frost.

Another instance in which clay products stand unique in fulfilling conditions unattained in like measure by anything else is that of asepsis. The glazed surface of wall tile, and particularly the vitreous clay floor tile, can be scrubbed or wiped up with antiseptic solutions, like bichloride of mercury, and even the most efficient of these, permanganate of potash, followed by hydrochloric acid, without the slightest damage or surface pitting. This is of course out of the question with marble or any other wall or floor covering, and is so well understood by those experienced in hospital building that it is now seldom called into question.

Numberless other instances of conspicuous qualities of clay products for particular purposes could be adduced, but these will suffice to illustrate that their difficulties and limitations are amply compensated and are worthy of consideration and compromises.

Fire-proofing.

ECONOMY OF FLOOR CONSTRUCTION.

BY CORYDON T. PURDY, C. E.

ECONOMY, or the lack of it, in floor construction does not depend alone upon choice of materials. The usual question, "What is the cheapest kind of floor?" is generally supposed to cover the subject; but really the arrangement of the construction is more important.

This was illustrated by several alternate plans suggested for the floors of a warehouse building recently designed in Boston, by Winslow, Wetherell & Bigelow, architects. They were made to afford the owners an opportunity to decide for themselves which would be the most desirable. There were two acceptable ways in which the columns could be arranged, and both of these were considered. These alternative schemes are shown in Figs. 1 to 9 inclusive. In each case the section is shown on a larger scale than the plan.

Estimates were also made of the cost per square foot of each of these floors, taking into account all the different elements of construction affected. These include the steel beams and girders, the terra-cotta arch, the column covering, the cinder concrete on top of the arches, the girder covering, the plastering, and that part of the external walls between the finished floor and the finished ceiling. The quantities were extended at the prices then current, and the results obtained are as shown in the following table:—

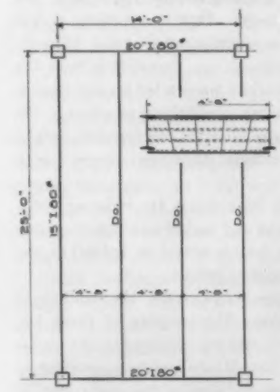


Fig. 1

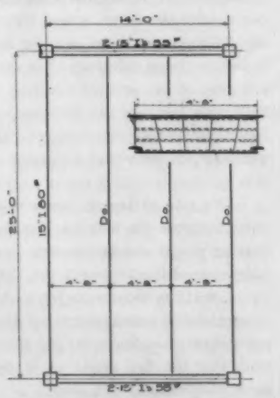


Fig. 2

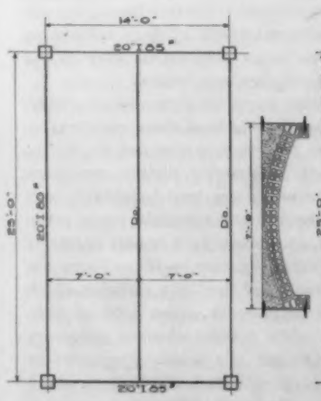


Fig. 3.

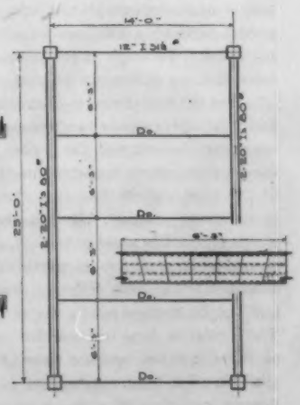


Fig. 4.

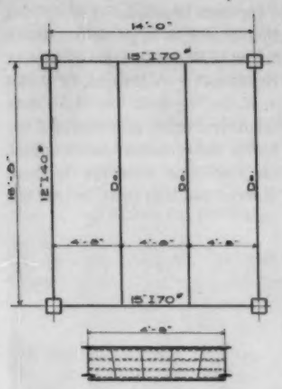


Fig. 5.

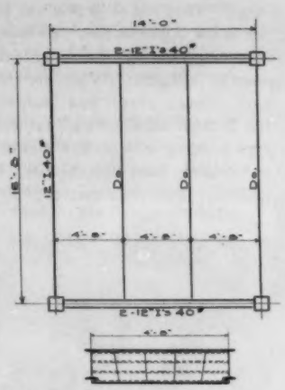


Fig. 6.

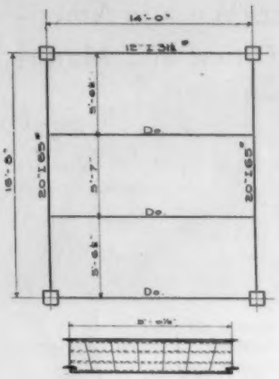


Fig. 7.

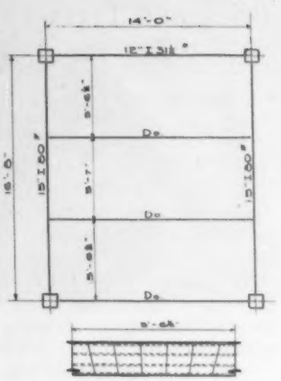


Fig. 8.

	FOR THE SCHEME SHOWN BY FIG.								
	1	2	3	4	5	6	7	8	9
Cost per sq. ft. of floor.	0.813	0.833	0.733	0.696	0.608	0.619	0.570	0.576	0.617

It may be noted that the cost per square foot of floor in each case where the columns are spaced 25 ft. apart is more than in each case where the columns are spaced closer.

The average rate of cost for the wider spacing of the columns is $.769, while for the closer it is $.598, the former being therefore on the average 28 per cent. costlier than the latter.

These results do not take the cost of the columns themselves into account, but that could not materially affect the result, especially in a heavy building such as this was. The total load to carry remains the same. In all but one case the estimate calls for a flat arch 15 ins. or 12 ins. in depth, according to the depth of the beam. In the one exception, that shown in Fig. 3, it calls for a 6 in. segmental arch. The dead weight of these arches as erected, including the weight of all the other elements of the construction, is given in the following table, which also indicates the actual working strength of both the beams and the girders, in each case figured on the usual basis of 16,000 lbs. per square inch ultimate fiber stress. The difference, as shown in each case, is the superimposed live load which each of the beams and girders will carry without straining them above that standard.

For the Scheme Shown by Fig.	Members.	Approximate Dead Load.	Maximum Load Possible with Ultimate Fiber Stress of 16,000 lbs.	Approximate Live Load.
1	Girders . .	92	387	295
	Beams . .	87	388	301
2	Girders . .	92	360	248
	Beams . .	88	404	316
3	Girders . .	84	345	261
	Beams . .	81	357	276
4	Girders . .	80	372	292
	Beams . .	67	340	273
5	Girders . .	75	350	275
	Beams . .	72	368	290
6	Girders . .	76	355	279
	Beams . .	73	396	323
7	Girders . .	73	381	308
	Beams . .	69	351	282
8	Girders . .	73	345	272
	Beams . .	69	351	282
9	Girders . .	75	348	273
	Beams . .	70	379	309

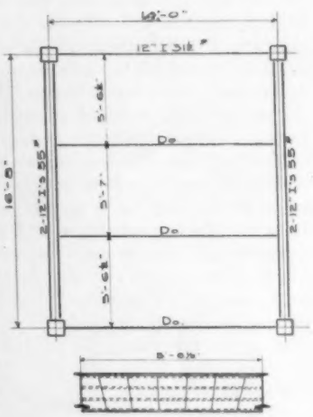


Fig. 9.

Not only do these alternative plans indicate that a close arrangement of columns is most economical, but it also shows that the arrangement of the beams independent of the spacing of the columns materially affects the cost. The comparison also shows that even the simplest forms of structural iron designing can well afford to be studied. The difference in the cost of the floor per square foot between the plans shown in Figs. 2 and 7 is $.263, which is nearly 50 per cent. of the cost of the cheaper one. In many buildings this would be 30 per cent. or 35 per cent. of the whole cost of the structural metal work in the building. In buildings even of very simple construction it is often possible to vary the arrangement of the columns in several different ways, every one of which multiplies the possibility of variation in the design of the framing. The chance of desirable or undesirable designing is therefore often greater than it was in this case, where only two arrangements could be considered and much more than is commonly realized.

THE educational value of an object lesson is not always measured by its cost in dollars and cents. A blaze started on the fifth floor of one of the fire-proof warehouses at the corner of Fulton Street and Elizabeth Place, Brooklyn, on May 8. The flames were confined to the one apartment in which they started, the room containing about seventy-five dollars' worth of furniture. The furniture was burned, but the fire-proof walls and the terra-cotta arches and partitions were not injured a particle. We well remember, in the early days of the Palmer House in Chicago, a statement was made that any room in that then famous hotel could be piled full of furniture soaked in kerosene and set on fire and allowed to burn out without any damage resulting to the building. From our recollection of the methods of fire-proofing in vogue at that time we imagine that that was a defy which, if accepted, might have brought disaster to the building. But in the present state of fire-proofing science, it has been repeatedly demonstrated that the entire contents of the room, in any properly constructed fire-proof building, can be entirely consumed without the slightest harm to the structure of the room.

Brick and Terra-Cotta Work in American and Foreign Cities, and Manufacturers' Department.

NEW YORK. — The increase in the use of brick for all sorts of building purposes has made the recent disagreements between the manufacturers and their employés a matter of serious import, but these difficulties are now happily ended and they are making brick as fast as possible. In spite of this the active demand has kept prices up to an unusually high figure, which is probably partly accounted for by the rise in prices of all other building materials.

The usual dull summer season has begun, that is, dull in regard to the beginning of new projects of importance, although architects and builders, as a rule, throughout Greater New York are fairly busy. With the settlement of our great rapid transit problems will come undoubtedly a boom in suburban real estate, which also will be vastly helped by the completion of our proposed new bridges. Visitors to the city are invariably surprised at the inability of our traction systems to handle the great crowds who flock to New York to do business, and it would seem upon viewing the great network of trolley lines, to say nothing of the doubling up by the use of elevated railroads, that the only solution will be some sort of flying machines. It remains to be seen what our wise legislators will decide. Just now the Brooklyn members are opposed to any improvements tending to build up the Bronx district, and New York members are set against the improvement of Long Island. While the "doctors are disagreeing" the people are suffering.

HOUSE AT TUXEDO PARK, N. Y.
T. Henry Randall, Architect.
(See plate form for drawings.)

TERRA-COTTA PEDIMENT FOR THE SOUTH BEND HOTEL BUILDING, SOUTH BEND, IND.
Executed by the American Terra-Cotta and Ceramic Company.
Shepley, Rutan & Coolidge, Architects.

Recent experiments have removed the one serious objection to the high building likely to have any weight with the community at large. That one objection was the apparent impossibility of fighting fire in the upper stories. To objections based on hygienic or esthetic reasonings, the public was quite deaf, or rather, they seemed to view them as mistaken. When the fire department maintained, as it did until recently, that it was incapable of dealing with fire more than 125 ft. from the sidewalk, that was another matter, as it invested the high building with possibilities of horror not pleasant to dwell upon. It has lately been demonstrated that protection from fire in these buildings is simply a matter of appliances and that their height has nothing to do with it. The new building code will doubtless require the installation of suitable auxiliary apparatus, approved by the fire department, in all buildings above a certain height, and graded as to sizes according to height, and that will be the end of the matter.

The report of the City and Suburban Home Company is interesting as showing the results of an undertaking of considerable proportions in meeting the housing wants of the industrial part of the community. The rates at which the company supplies accommodations are given, and the net results show an earning of 5 per cent. on the capital stock, so that the enterprise has proved not only philanthropic but profitable.

HOUSE AT TUXEDO PARK, N. Y.
T. Henry Randall, Architect.
(See plate form for drawings.)

J. T. Williams, architect, has prepared plans for a four-story brick store and office building to be built on West Street, corner of Beach Street; cost, $125,000. Robert Maynicke, architect, has planned an eleven-story office building to be built at 244 Fifth Avenue; cost, $150,000. John H. Duncan, architect, has prepared plans for a five-story brick dwelling to be built on 54th Street, near Fifth Avenue; cost, $48,000. Ernest Flagg, architect, has planned nine six-story brick flats for the New York Fire-proof Tenement Association, 35 Wall Street, New York; the total cost will be $337,500. C. C. Haight, architect, has planned a five-story brick dwelling to be built on 78th Street, East, near Fifth Avenue; cost, $80,000.

PHILADELPHIA. — In this city to-day, it is truly said, there need not be an idle draftsman. Not for years has there been so much business in the hands of architects, and in spite of the fact that the number of architects' offices has doubled in the past decade,

all are busy. That so many of the younger men have opened offices probably accounts for the dearth of draftsmen to some extent, but with universities and schools training so many for the profession, it has always been dreaded the supply would much overtop the demand.

It naturally follows that builders are very busy, some of them having many million dollars' worth of work in hand.

Amongst the larger operations may be noted the United States Mint, now at the second-story level. In spite of the criticism of one of our legislators, who thought the design too plain for a mint and too ornamental for a jail, it is certainly a credit to the supervising architect's office. The great length of its horizontal lines gives it much dignity. Like much government work, the contract for erection has been given out one piece at a time, the first contractor having put in the foundations, and the present puts the building under roof. Much controversy was raised about the material to be used for the facing; this ended in the selection of granite from the Mt. Desert quarries. The lower story looks well in granite, but it is a question whether that material be the most suitable for the upper story with the pilasters and lighter work that enter into the design.

A huge undertaking, said to be entirely in the hands of a contractor and builder, is the rebuilding of the Wanamaker store at 13th and Market Streets. Ten stories high and covering a whole block in the most prominent part of the city, it is much to be regretted that an architect of ability has not been called upon for the design of the shell at least. The design proposed has not been made public, but it may be safely said that the builder's architecture cannot be all that Philadelphia should expect on its principal business site. In the present store may be seen in use an inclined traveling plane for the conveyance of passengers from first to second floors.

ADMINISTRATION BUILDING, McLEAN HOSPITAL, WAVERLY, MASS.
Shepley, Rutan & Coolidge, Architects.

RESIDENCE OF VALENTINE WINTERS-ESQ.
FRANK M. ANDREWS-ARCHITECT- DAYTON-O

The buildings to be occupied by the Commercial Exhibition, which is to take place in the beginning of autumn, are from designs by Wilson Brothers, architects. They are not to be flimsy, temporary structures, but are of thick, brick walls and steel columns and trusses. The three main wings are intended for permanent use as a commercial museum; the temporary covering of an improved form of staff, guaranteed to stay in good condition for five years, is to be replaced eventually by stone or marble, the Renaissance design to be duplicated.

The finished portion of the University Museums is a delight to the eye of the architect. There is nothing in the design that is trite; one desiring to study the modern use of brick and terra-cotta could not do better than examine it closely.

Edgar V. Seeler has chosen the architecture of the churches of Caen for a guide in designing the exterior of the First Baptist Church just commenced at 17th and Sansom Streets. This design was selected in a competition with some half dozen competitors. The interior promises to be a fine architectural effort, the opportunity for color effects being magnificent. In

BELKNAP HOUSE FOR MEN, McLEAN HOSPITAL, WAVERLY, MASS.
Shepley, Rutan & Coolidge, Architects.

plan it is a Greek cross, spanned by great semicircular intersecting vaults, the architecture naturally Byzantine.

Another church competition is announced. One might well say, when are we to have an architect sufficiently prominent to be given a church to build without submitting plans in competition? The

TERRA-COTTA DETAIL FOR THE POSNER BUILDING, BALTIMORE, MD.
Executed by the New York Architectural Terra-Cotta Company.
Chas. E. Cassell, Architect.

Wylie Memorial Church on South Broad Street is the latest. The invitation to compete is limited to five firms. The remuneration offered each is so small that it is stated some of the five do not intend to take the risk.

Architects in Philadelphia are rejoiced at the safe recovery from serious illness of one of their foremost men. Mr. Theophilus P. Chandler, who has been employer at one time or other of half the rising generation of architects, is just able to be at his office again after an attack of typhoid fever.

CHICAGO.— Reports of building operations for May show some encouraging increase in their volume as compared with the same month a year ago. While such comparisons by months are apt to mislead, it is clear that there is an increased interest in building on the part of the public, which is making itself felt here in spite of high prices and labor troubles. Chicago has been aptly spoken of as the "storm center" for labor difficulties in the building trades.

TERRA-COTTA DETAILS.
Executed by the Indianapolis Terra-Cotta Company.
Edward Van Leyen, Architect.

Two headings in a recent number of the *Construction News* illustrate this: "Abolishing Machines in Stoneyards" and "Labor Unions Enjoined." Under the former heading it is stated that on and after June 1, at the behest of the Chicago Stonecutters' Union, every lathe and plane in every yard in the city and suburbs will be idle until these *fin-de-siècle* reactionists of the old English trades union type learn that instead of making work for more hands by abolishing the machine, they have simply destroyed a large percentage of the demand for cut stone,— turned men now employed out of employment and played into the hands of the brick and terra-cotta makers.

Of late years the cheapness of Indiana limestone or "buff Bedford," as it is commonly called here, no matter where quarried, has, together with improved machinery for sawing, surfacing, molding, and turning, made it possible to erect sham stone buildings, common brick building veneered with 6 ins. or even less of machine-dressed ashlar, for less than the cost of first-class brickwork. These soon turn a dark color, wholly lacking in warmth or richness, a sad, cold, neutral gray, even in the outlying districts where the atmosphere is comparatively clear. For this reason an increase in the cost of cut stone is not altogether a misfortune from the architect's standpoint.

The Winslow Brothers Company, the well-known manufacturers of architectural iron and bronze work, have recently, through a decision made by Judge Holdom, enjoined the Building Trades Council, the Architectural Iron Workers' Union, and several individual members thereof, from interfering by acts of violence, threats, intimidation, or physical force, with the reconstruction of their Lakeside building, and other work of the complainant company.

This is the first injunction ever secured against the Building Trades Council, and while the company failed to secure all that it asked for in its bill, they feel that they have gained a substantial victory. Their success will certainly encourage other sufferers from the arrogance and lawless interference of the Council to seek similar relief through the courts. While the possible abuses of "government by injunction" are certainly great, it seems the only available remedy in such cases as this.

TERRA-COTTA COLUMN FOR THE SLATER HOUSE, NEWPORT, R. I.
Executed by the Conkling-Armstrong Terra-Cotta Company.
Peabody & Stearns, Architects.

Among recently projected structures of importance is a new building for the Chicago hospital, and a large apartment house on Grand Boulevard. The hospital is to be erected on 51st Street, near Cottage Grove Avenue, and will be one of the largest and most completely equipped private hospitals in the United States. The plan consists of a hexagonal rotunda or central pavilion, with a large portico in front and five radial wings, each over 125 ft. long. The construction is to be fire-proof and the exterior walls will be finished in brick and terra-cotta. The roof will be of tile. The central rotunda, which is to be five stories high, is to be vaulted below the fourth floor and supported on marble columns at the angles of the hexagon, with a

gallery intervening at the third floor. A new feature of the interior finish in addition to mosaic, marble, cement, and tile will be the use of aluminum for doors in the operating rooms. The dining room will be on the fifth floor of the central pavilion and will be reached by two electric elevators. This room will have a

KEY, MAIN ENTRANCE, BROAD STREET NATIONAL BANK, TRENTON, N. J.
Executed in mottled gray terra-cotta by the Excelsior Terra-Cotta Company.
William A. Poland, Architect.

domed ceiling corresponding with the exterior. This utilization of a central dome is a rather unusual and certainly admirable idea. The proposed cost is about $200,000, and the architects are Messrs. Barfield and Hubbell. Wilson & Marshall have let contracts for the erection of two apartment buildings, to be known as "The Mansions," on Grand Boulevard, near 38th Street. The proposed cost is about $175,000, and the general plan is a symmetrical front court scheme, quite elaborately carried out in Gothic, with brick and stone exterior walls and steep, picturesque, red-tiled roofs. The court will be adorned with a fountain and enclosed with an elaborate iron fence and gates. There will be sixty-four apartments of from four to eight rooms, and special care has been given to thoroughly subdivide the building by fire walls.

ST. LOUIS. — An event of no small moment was the recent exhibition of the St. Louis Architectural Club, which closed on May 8. It was the second attempt of the club to hold an exhibition of magnitude, and the results have been very gratifying, especially on account of the short time following the Chicago exhibition in which to hang the drawings. The interest shown in the exhibition will doubtless encourage the club in holding similar ones. As most of the drawings have been on exhibition in the various cities and have been commented upon, it would be useless to attempt anything of the kind here. The tendency of the architecture of the different cities to reflect the distinctive characteristics of its people is strikingly manifest. This fact is pointed out clearly in an article in the recently issued catalogue of the Boston Architectural Association, and is favorably received as an indication of more serious thought and study, which may eventually give us a style of architecture of our own. There is no doubt that these exhibitions are productive of much good and should have the hearty support of all interested in the architecture of the country.

Considerable interest has been taken by the architects and builders in an effort to get a capable man appointed as building commissioner. For some years the office has been practically a dead letter, and, although St. Louis has a good building law, very few of its provisions have been enforced, and, as a consequence, the unscrupulous builder and investor have gone on unchecked.

The architects have met with disappointment in their efforts to have a bill passed by the last legislature requiring architects practising in the State to have a license.

Real estate has been very active during the spring, especially in down-town districts, and much of the trading is done with a view to improving. Washington Avenue continues to be the center of attraction, although important transactions have taken place throughout the business district, where large improvements are contemplated. Most of the architects are busy and all feel encouraged. The sudden increase in prices, together with the uncertainty as to the location of the site of the coming World's Fair, has doubtless been the cause of more or less work being held back, but this can only be for a short time. There seems to be little if any cause for anxiety about labor troubles this season, as every one seems to be well satisfied with the outlook. It is rumored that Eames & Young have the Federal prison to be built by the government in Georgia.

The city has at last decided to go ahead with the new city hospital, and an ordinance has been introduced into the municipal assembly to that effect. The City Hospital Commission made their report and submitted plans two or three years ago, but the city has been unable to commence work on account of the lack of funds. The hospital will be built on the pavilion plan on the site of the old building destroyed by the cyclone three years ago.

CURRENT ITEMS OF INTEREST.

THE GRUEBY FAIENCE COMPANY have been awarded the contract for finishing with dull-surfaced enameled tiling the interior of the May Memorial Chapel, Rose Hill Cemetery, Chicago; J. L. Silsbee, architect.

THE WILLIAMS PATENT CRUSHER AND PULVERIZER COMPANY are installing a No. 3 pulverizer — their largest size — at Dennings Point Brick Company, Fishkill, N. Y., for grinding bats and sand; also a No. 2 pulverizer at I. B. Stiles & Son, North Haven, Conn., for grinding bats and coal. These pulverizers are particularly

PEDIMENT PANEL 20TH WARD SCHOOL, PITTSBURGH, PA.
Executed by the Northwestern Terra-Cotta Company.
C. M. Bartberger, Architect.

adapted for the use of manufacturers desiring to powder their bats for dryer and sand.

THE ROBERT AITCHISON PERFORATED METAL COMPANY announce that they have added to their already large complement of dies a very complete assortment of slotted oblong sizes suited for clay screens.

UNION PASSENGER STATION, OMAHA, NEB.
Walker & Kimball, Architects.
Roofed with Ludowici Roofing Tile.

BURGY & MCNEILL announce that they are putting on the market a new wall tie which has the favorable indorsement of 90 per cent. of the architects in Pittsburgh. Samples of same will be sent to all applicants.

J. C. EWART & Co. are furnishing their Akron Roofing Tile for the following buildings: a large carriage house on the Elkins estate, near Philadelphia; a block in Chicago (vitrified flat tile); also for the Williams residence in Columbus, Ohio.

THE C. P. MERWIN BRICK COMPANY, Berlin, Conn., are furnishing, through the Central New England Brick Company, the hollow brick for a library at New Britain, Conn., Davis & Brooks, architects; also for the Segel Block, Boston; and a school building at Worcester.

WE are in receipt of a small booklet from the Clinton Metallic Paint Company discussing the requirements of a really good roof cement. The company claim that their silk fiber cement possesses all the requisite qualities of such an article, and offer to send a sample pail to any party interested in using a good roofing cement.

ON May 24 a change was made in the firm of Fiske, Homes & Co., managers of the Boston Fire Brick Company, by the retirement from the concern of Mr. William Homes. The business is now conducted under the title of Fiske & Co., composed of George M. Fiske and L. Parker B. Fiske. The company will continue to handle the same general lines of burnt clay products.

THE following list comprises a few of the buildings recently equipped with the Bolles Revolving Sash: Passaic Bank, Passaic, N. J.; a residence at 7 W. 72d Street, New York City; a residence at Park Avenue and 67th Street, New York City; the Chemistry Building, Smith College, Northampton, Mass.; the Camden High School, Camden, N. J.; Schools No. 28 and No. 9, Buffalo, N. Y.; School No. 17, Jersey City; school at Plainfield, N. J.; New York and New Jersey Telephone Building, Newark, N. J.

ANDREW RAMSEY, lessee of the Mt. Savage Enameled Brick Company, has secured the contract to furnish the enameled brick for McMullen Brothers' store at Cumberland, Md., J. S. Seibert, architect. The building, as estimated, will cost about $150,000. Façade is to be of white enameled brick with brown enameled molded brick trimmings. This is the third store front in their vicinity for which this company have furnished the enameled brick.

MERCHANT & CO., INC., of Philadelphia, New York, and Chicago, report a heavy increase in tin and Babbitt metal business. They have recently taken, among numerous others, a carload order for Babbitt metal from a large Western machinery manufacturing company, the shipment consisting of an assortment of grades. This order was placed after an exhaustive list of samples from a number of manufacturers. This company has been manufacturing all grades of this metal for a quarter of a century, and their present large business in this line is a fitting tribute to their thorough experience and reliability in its manufacture.

THE WHITE BRICK AND TERRA-COTTA COMPANY have secured contracts to furnish the architectural terra-cotta for the following buildings: apartments 83d Street and West End Avenue, architect, Henry Anderson; apartments 138th Street and Third Avenue, architect, Harry T. Howell; club house, Yonkers, N. Y., architect, A. F. Leicht; terrace wall, Great Neck, L. I., architects, Little & O'Connor; apartments 107th Street and Columbus Avenue, architect, Samuel Sass; Battery Park Building, State and Pearl Streets, architects, Clinton & Russell; apartments 129th Street and Eighth Avenue, architect, Henry Anderson.

THOMAS B. FREEMAN, Pittsburgh, has moved from the Carnegie Building to larger quarters in the Smith Building. Mr. Freeman has for a number of years been identified with the building material business in Pittsburgh as a dealer in high-grade clay products. In his new offices he has increased facilities for promptly conducting business, and a better opportunity to display to advantage samples of the various lines which he handles. His specialties are face brick, architectural terra-cotta, enameled brick, floor tiling, wall ties, etc.; also the product of the Mosaic Tile Company, of Zanesville, Ohio.

FIGURE FOR RITTENHOUSE APARTMENTS, PHILADELPHIA.
Executed in terra-cotta by the Perth Amboy Terra-Cotta Company.
Willis G. Hale, Architect.

MERCHANT & CO., of Philadelphia, have recently prepared and are sending out three treatises on tin roofing well worthy of consideration by architects, engineers, and every one interested in this material. The first thoroughly explains "How Roofing Tin Is Made"; the second tells "How a Tin Roof Should Be Laid and Painted"; the third shows in detail the difference between Merchant & Co.'s method of making plates and the old Welsh method, and the reasons for claiming superiority for the method employed by Merchant. These pamphlets will be sent to any one making request for same to the company.

THE R. GUASTAVINO COMPANY recently issued the following circular letter relative to the popularity of their system of fire-proof construction: —

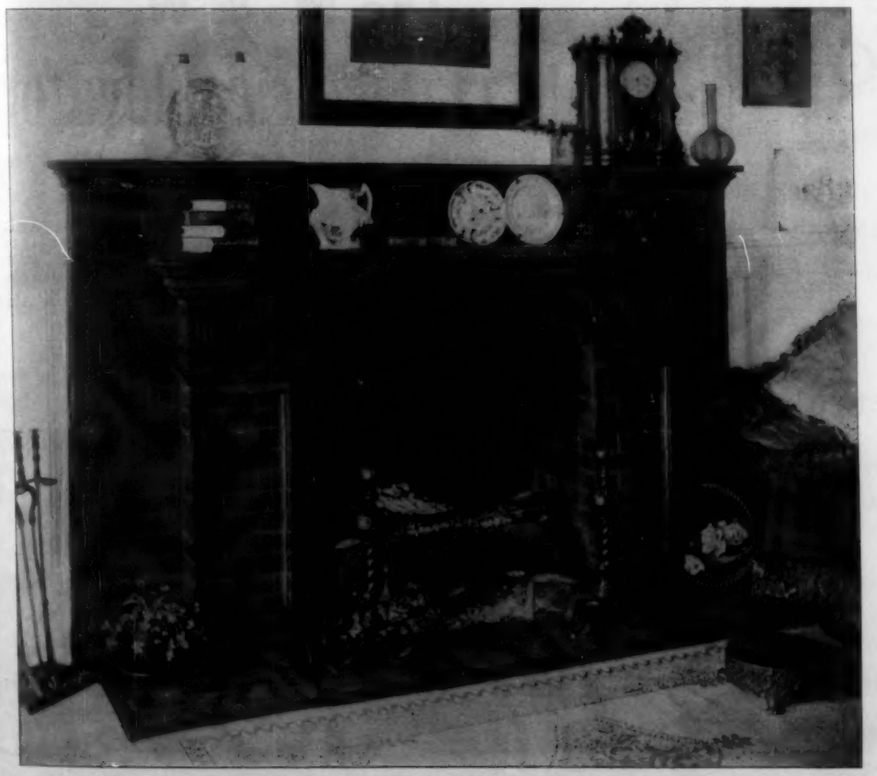
"As an instance of the general acceptance of our construction by the leading architects of the country, in some cases for economy, in some for effect, and always for stability, we note that in the current catalogue of the architectural exhibition, Boston Architectural Club and Boston Society of Architects, that out of the relatively few fire-proof buildings illustrated therein, our system was applied in six of them.

"In the catalogue of two years ago, we observe that there were illustrated five different buildings containing our construction."

THE AMERICAN ENAMELED BRICK AND TILE COMPANY have secured contracts to serve their enameled brick on the following buildings: Cornell Medical College, McKim, Mead & White, architects; fire-engine house, 22 E. 12th Street, New York, Horgan and Slattery, architects; Comfort Station, Hamilton Fish Park, New York City, Kelly & Kelly, engineers; City Hospital, Worcester, Mass., Urgel Jacques, builder; Oelrich House, Newport, R. I., McKim, Mead & White, architects; apartment house, corner 110th Street and Riverside Drive, New York City, Walter Reid, builder; Staten Island Water Works (pumping station), Elm Park, Staten Island; Bechtel Brewery Extension, Stapleton, Staten Island; residence, Poughkeepsie, N. Y., Burger & Slater, builders. They also report a contract with Waring, Chapman & Farquhar, sanitary engineers, New York City, to furnish that firm with all the glazed brick required by them in their work this year. Shipments on this contract are being constantly made to points in various parts of the country, such as Sedgwick, Pa., Cedarhurst, L. I., Stockbridge, Mass., Southampton, L. I., Easthampton, L. I., and Sharon, Staten Island.

THE REESE-HAMMOND FIRE BRICK COMPANY, of Bolivar, Pa., is an interesting illustration of the growth of one of Pennsylvania's active industries, namely, the manufacture of high-grade fire brick and building brick. The firm of Reese-Hammond Company was organized in 1866 by James Hammond, Thomas Hammond, and Isaac Reese. In 1867 the capacity of the works reached an output of 2,200 rolling mill brick daily. Since that time the firm has gradually extended its plant and acquired clay properties until it has now some 1,200 acres of valuable deposits and a daily output of over 100,000 brick. Extensions to the plant are now under way, which will increase this capacity to 150,000 within a few months.

The company manufactures all varieties of high-grade fire brick and vitrified paving brick, also a particularly fine line of impervious repressed front brick in various shades of buff, brown, and gray. The present officers of the company are: James Hammond, president; B. F. Reese, vice-president; J. B. Hammond, secretary and treasurer; and T. M. Berkey, general superintendent. The sales department is managed by Thomas McConville and Thomas I. Brette. The general offices of the company are at Bolivar, Pa., with a branch office in the Bissell Block, at Pittsburgh.



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THE OLD COMPARED WITH THE NEW.

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The art of making the best tin plate has progressed, as have all other arts, so that the best product of to-day is superior to that made by the old Welsh method. The superiority of the best modern plates lies largely in the thoroughly even distribution of the coating metal over the black sheet. This is an important thing for every buyer or user of tin plate to know.

Messrs. MERCHANT & CO., Inc., of Philadelphia, New York, and Chicago, who have for so long a time made a specialty of the highest grade of plates, have contributed some valuable literature on this material within the last year, viz.: their booklet, "HOW ROOFING TIN IS MADE" and "HOW A TIN ROOF SHOULD BE LAID"; but not less interesting and valuable is their latest issue entitled "NOT JUST AS GOOD, BUT ACTUALLY BETTER," which minutely describes the difference between their method of making plates and the old Welsh method. It will afford them pleasure to mail any one, or all three, of these little works to any name and address sent them to Philadelphia, New York, or Chicago.

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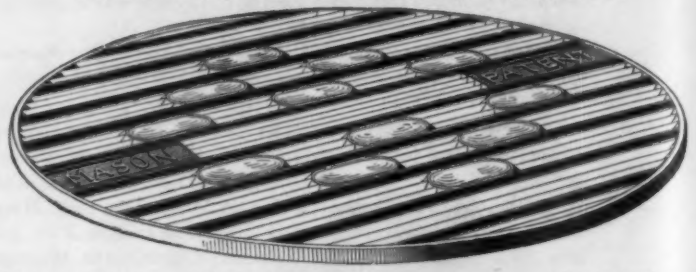

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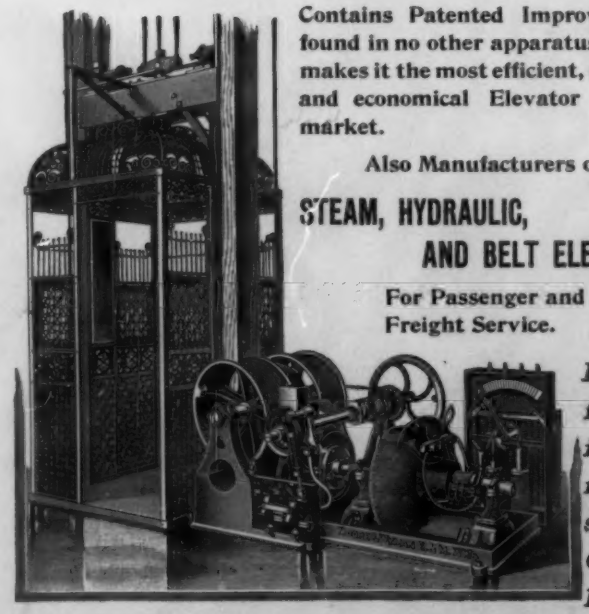

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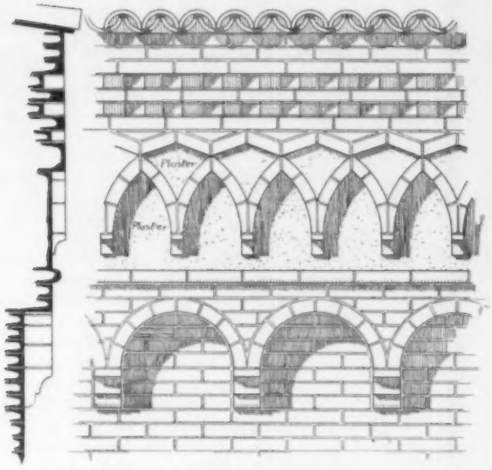

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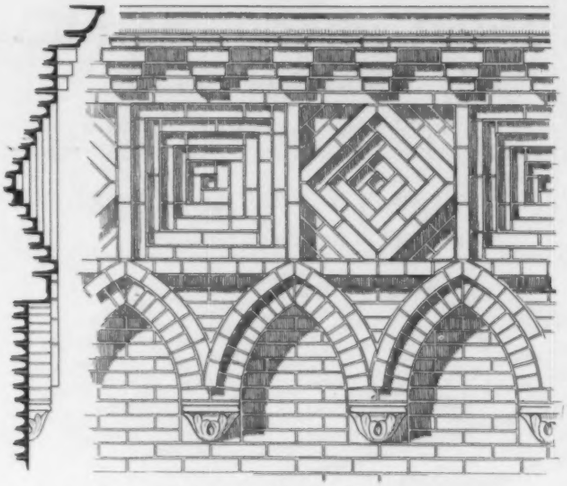
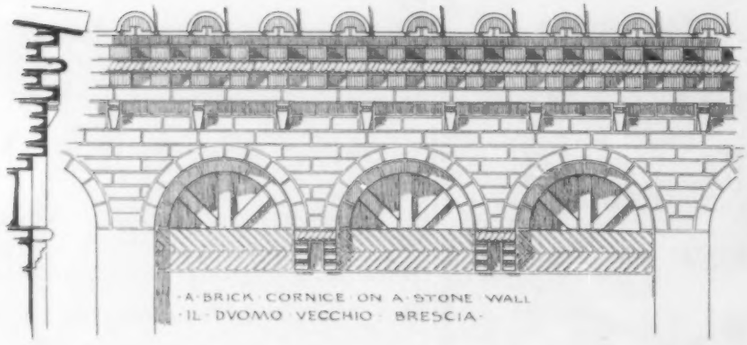
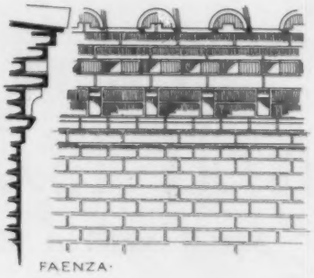

SS. GIOVANNI E PAOLO · VENICE


A BRICK CORNICE ON A STONE WALL
IL DVOMO VECCHIO · BRESCIA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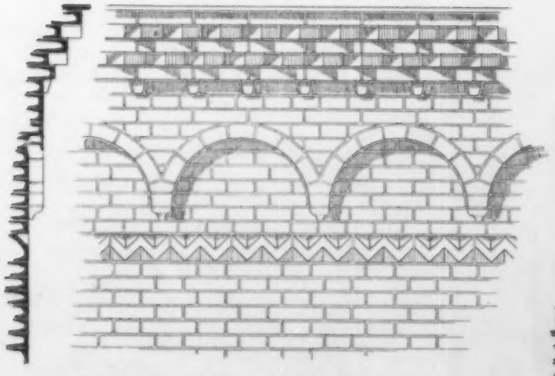
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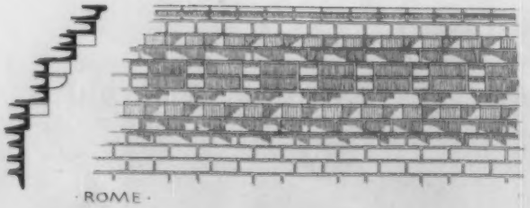
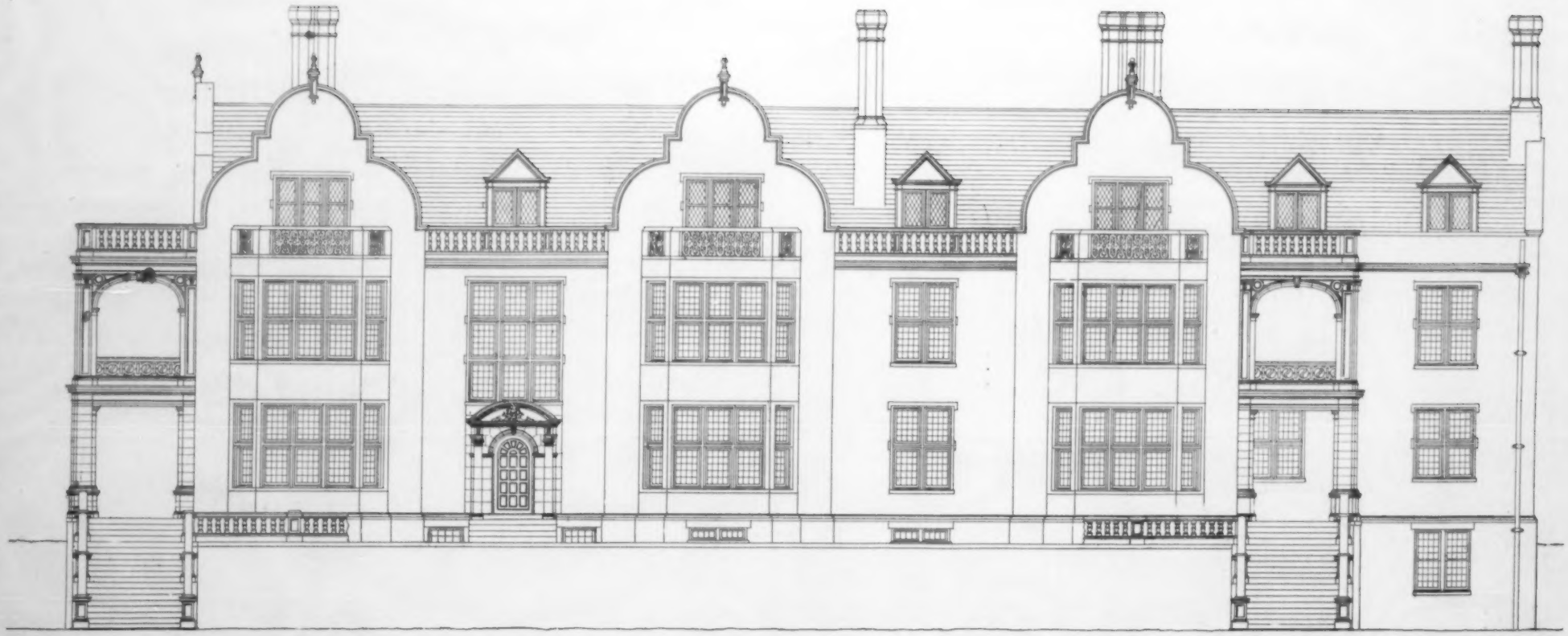
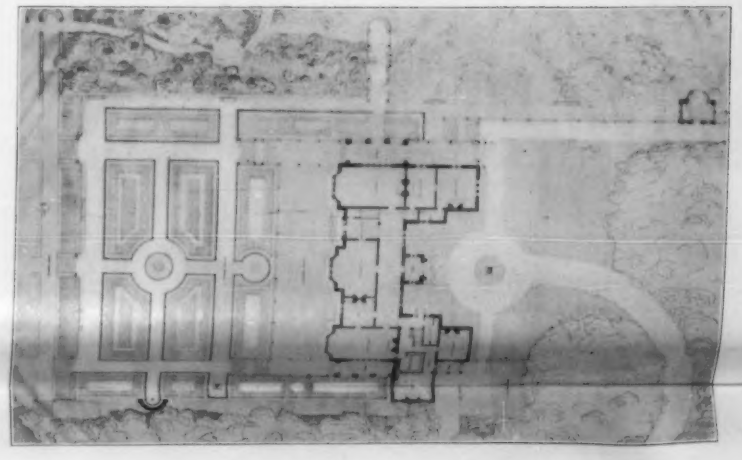

ROME



SOUTH ELEVATION.



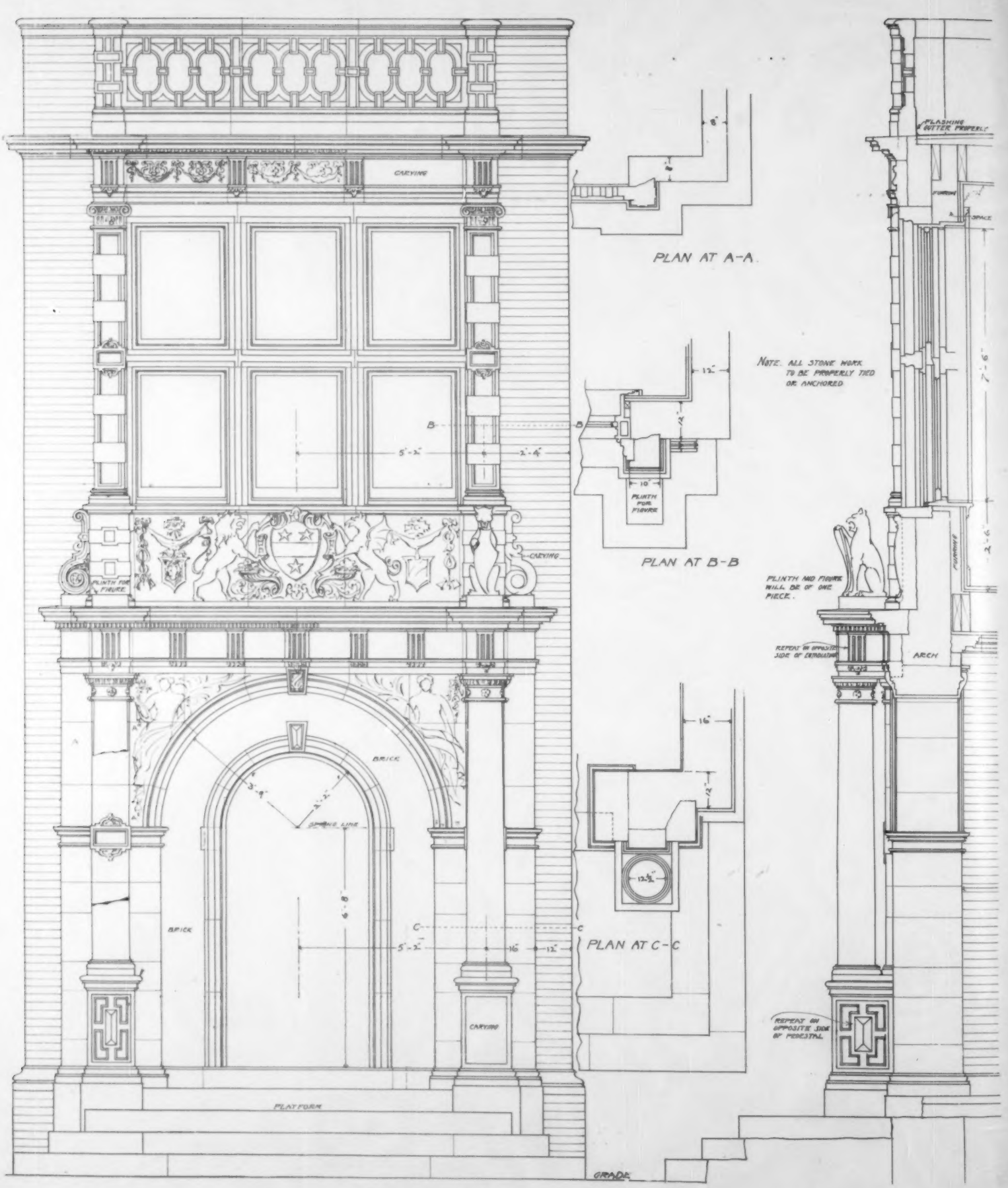
GROUND AND FLOOR PLAN.

WEST ELEVATION.

NORTH ELEVATION.

HOUSE AT TUXEDO PARK, NEW YORK.

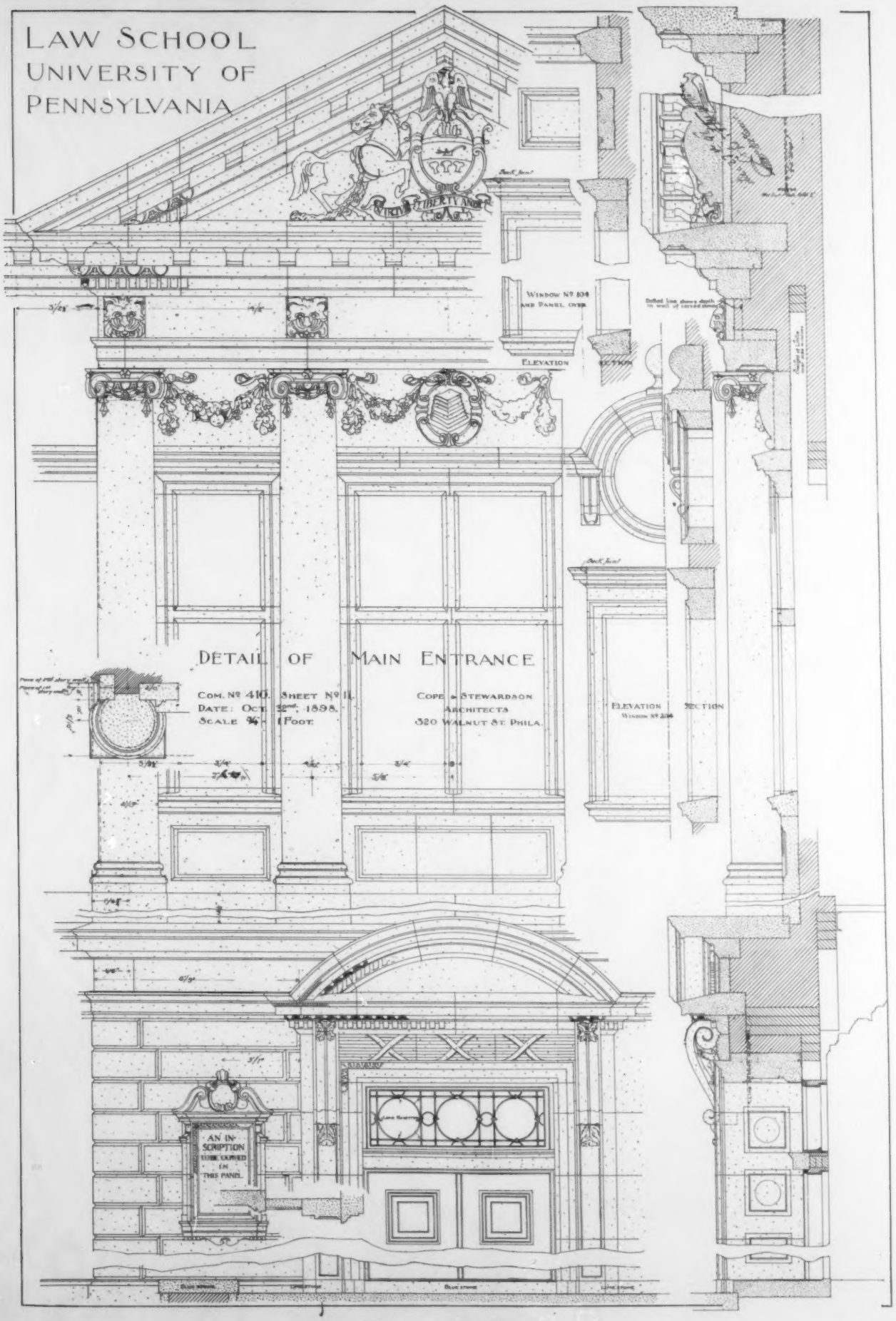
T. HENRY RANDALL, ARCHITECT.



DETAIL OF NORTH ENTRANCE.

HOUSE AT TUXEDO PARK, NEW YORK.

T. HENRY RANDALL, ARCHITECT.

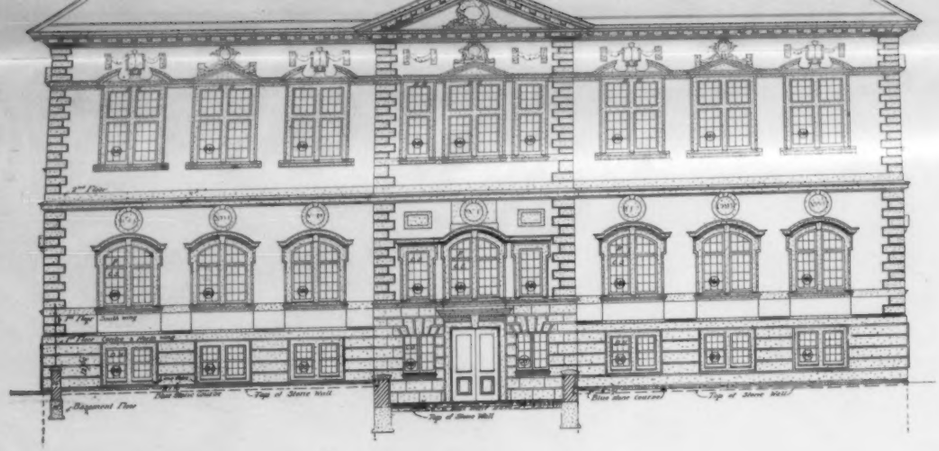


DETAIL OF MAIN ENTRANCE.

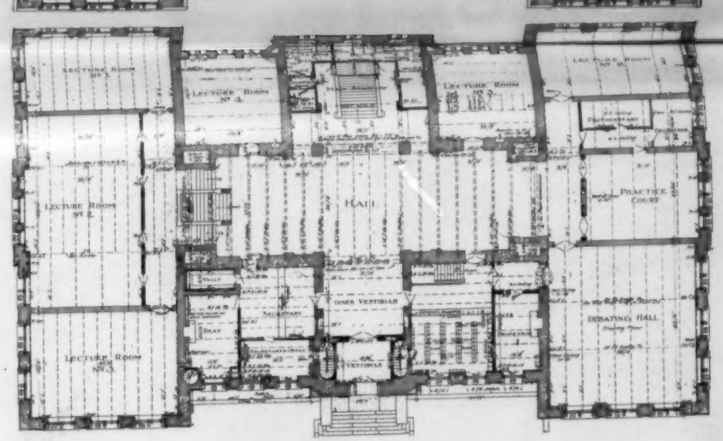
LAW SCHOOL, UNIVERSITY OF PENNSYLVANIA.

COPE & STEWARDSON, ARCHITECTS.

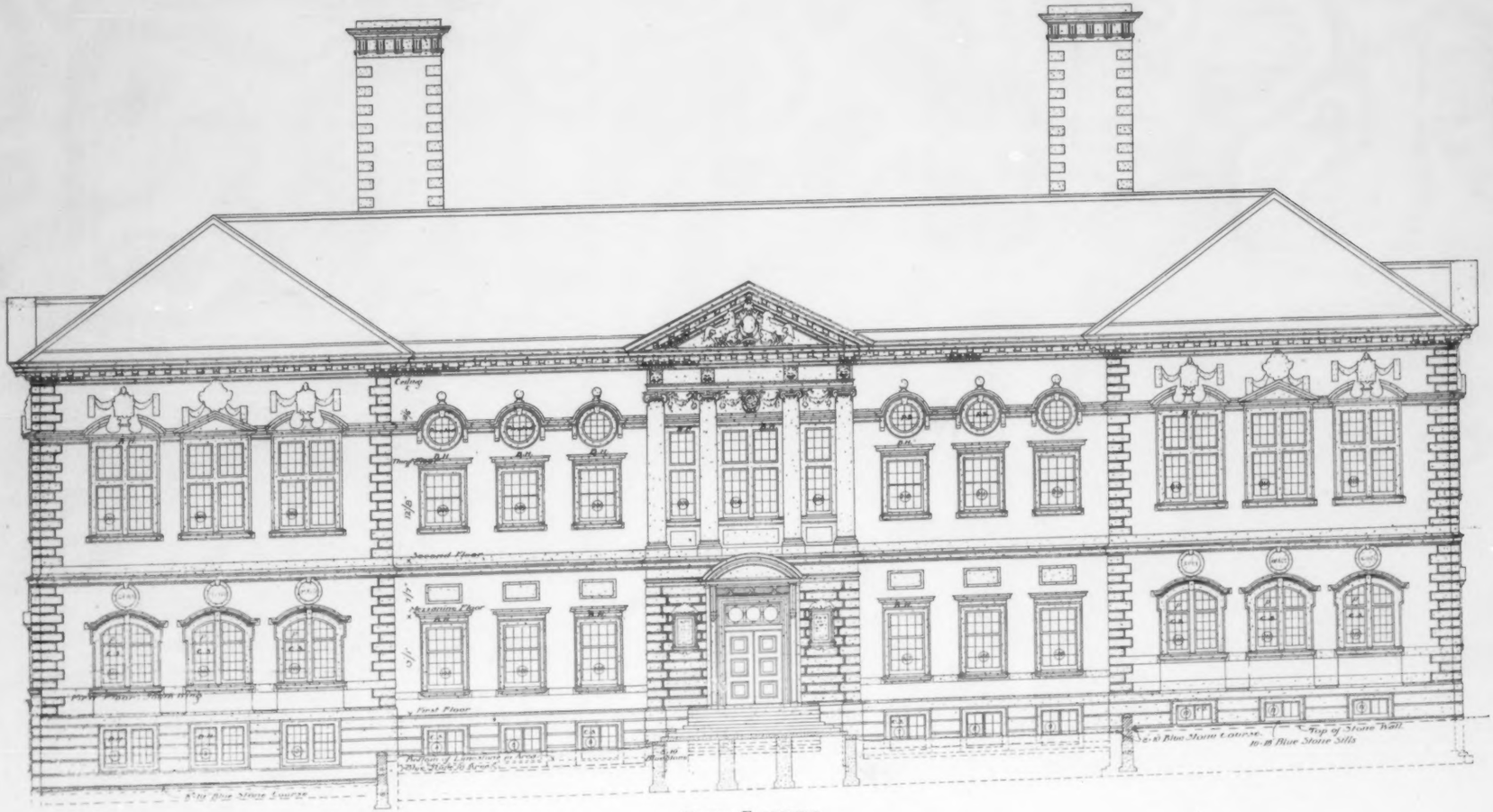
REAR ELEVATION.



SIDE ELEVATION.



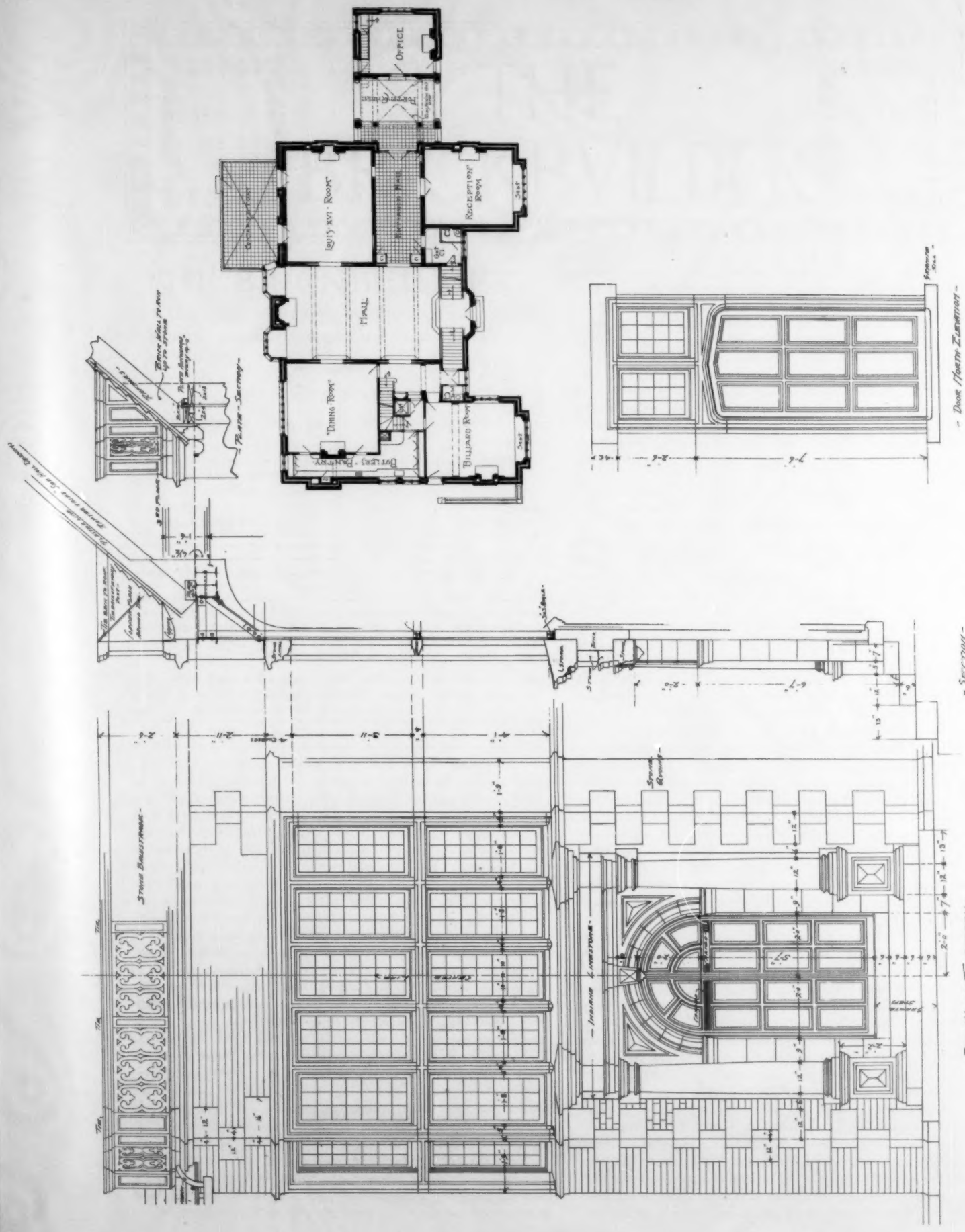
FIRST AND SECOND FLOOR PLANS.



FRONT ELEVATION.

LAW SCHOOL, UNIVERSITY OF PENNSYLVANIA, PHILADELPHIA, PA.

COPE & STEWARDSON, ARCHITECTS.



HOUSE AT HAMILTON, MASS.

WINSLOW, WETHERELL & BIGELOW, ARCHITECTS.

Elevation shown on page 111.